Docket No.	:	ADAMSRI.031A	**Customer No.: 20,995**
Application No.	:	10/664,699	
Filing Date	:	September 18, 2003	

APPEAL BRIEF

Applicant	:	Leary et al.
App. No	:	10/664,699
Filed	:	September 18, 2003
For	:	AIRCRAFT WATER HEATING SYSTEM
Examiner	:	Mark H. Paschall
Art Unit	:	3742

CERTIFICATE OF EFS WEB TRANSMISSION

I hereby certify that this correspondence, and any other attachment noted on the automated Acknowledgement Receipt, is being transmitted from within the Pacific Time zone to the Commissioner for Patents via the EFS Web server on:

July 25, 2007
(Date)

Robert J. Roby, Reg. No. 44,304

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Appellant, Applicant in the above-captioned patent application, appeals the rejection of Claims 1, 2, and 4-25 set forth in the Office Action mailed on January 31, 2007 (hereinafter "the Final Office Action"). All of these claims have been twice rejected. In accordance with the Notice of Appeal filed May 31, 2007, Appellant submits this Appeal Brief. Please charge any fees that may be required now or in the future to Deposit Account No. 11-1410.

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is the assignee of the present application, Adams Rite Aerospace, Inc. ("Assignee"). Assignee is the owner of one-hundred percent interest in the present application as evidenced by an assignment recorded at Reel No. 014519, Frame 0848 by the Assignment Branch of the United States Patent and Trademark Office.

II. RELATED APPEALS AND INTERFERENCES

Appellant, Appellant's legal representative and Assignee are unaware of any prior or pending appeal, interference or judicial proceeding that may be related to, that may directly affect, that may be directly affected by, or that may have a bearing on the Board's decision in the present appeal. Because of this lack of knowledge, no decisions are included in the appendix labeled RELATED APPEALS AND INTERFERENCES.

III. STATUS OF CLAIMS

Currently, the following status exists for each of the claims: Claims 1, 2, 4 and 6-25 stand rejected as being unpatentable. Claims 3 and 5 were previously cancelled.

The rejections of Claims 1, 2, 4 and 6-25 are being appealed.

IV. STATUS OF AMENDMENTS

No amendments have been filed subsequent to the rejection. Therefore, the claims before the Board appear as they were rejected in the Office Action mailed on January 31, 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present application includes three independent claims, Claims 1, 14 and 19. Each independent claim is summarized below, with citations to corresponding portions of the originally-filed specification and drawings as required by 37 C.F.R. § 41.37(c)(1)(v). The originally-filed specification and drawings are attached as Exhibit A. These citations are provided to illustrate specific examples and embodiments of the recited claim language and may not include all examples of the recited claim language. Further, these citations should not be used to limit the claims.

Claim 1

Claim 1 is directed to a water heating apparatus for use with a wash basin on an aircraft. The water heater comprises:

- a tube (*see, e.g., element 10 in Figure 1, and page 2, paragraph **[0012]**, lines 1-2*) made of a good heat conductive material (*see, e.g., page 2, paragraph **[0013]**, lines 1-3*);
- the tube comprising a plurality of coils (*see, e.g., Figure 1 and page 3, paragraph **[0013]**, lines 6-8, and page 4, paragraph **[0018]**, lines 1-4*) with each coil either engaging or being close to an adjacent coil (*see, e.g., Figure 1*);
- an electric heater (*see, e.g., element 12 in Figure 1 and page 2, paragraph **[0012]**, lines 2-3*) extending along a substantial length of the tube in good heat conductive relation with the tube (*see, e.g., page 2, paragraph **[0012]**, lines 2-3 and 4-7*);
- the electric heater being positioned exterior to the tube such that deposits do not form on the electric heater (*see, e.g., Figure 1 and page 4, paragraph **[0018]**, lines 1-5*);
- the heater comprising coils with each heater coil being adjacent to a pair of adjacent tube coils but not encircling an axis of the tube (*see, e.g., Figure 1 and page 4, paragraph **[0018]**, lines 1-5*); and

- the substantial length of the tube along which the electric heater extends defining a volume of less than that required to contain approximately 14 ounces of water such that a user on the aircraft can obtain a supply of heated water having a volume of less than approximately 14 ounces before the water heater begins heating a new supply of heated water (*see, e.g., page 3, paragraph **[0015]**, lines 4-6 and paragraph **[0016]**, line 5).*

Claim 14

Claim 14 is directed to a method of heating small volumes of water for intermittent usage in a wash basin on an aircraft. The method comprises:

- providing a tube (*see, e.g., element 10 in Figure 1, and page 2, paragraph **[0012]**, lines 1-2*) that can be connected to a water outlet;
- the tube being made of a good heat conductive material (*see, e.g., page 2, paragraph **[0013]**, lines 1-3*);
- providing an electric heater (*see, e.g., element 12 in Figure 1 and page 2, paragraph **[0012]**, lines 2-3*) that is in good heat conductive relation with the tube (*see, e.g., page 2, paragraph **[0012]**, lines 2-3 and 4-7)*; and
- the tube and the electric heater being in contact over a length that defines a volume of less than that required to contain approximately 14 ounces of water such that a user on the aircraft can obtain a supply of heated water having a volume of less than approximately 14 ounces before the water heater begins heating a new supply of heated water (*see, e.g., page 3, paragraph **[0015]**, lines 4-6 and paragraph **[0016]**, line 5).*

Claim 19

Claim 19 is directed to an aircraft sink water heater. The aircraft sink water heater comprises:

- a water tube (*see, e.g., element 10 in Figure 1, and page 2, paragraph **[0012]**, lines 1-2*) comprising an inlet and an outlet;

- the water tube comprising a spiral configuration to define a series of water tube coils (*see, e.g., Figure 1 and page 3, paragraph **[0013]**, lines 6-8, and page 4, paragraph **[0018]**, lines 1-4*);
- an electric heater (*see, e.g., element 12 in Figure 1 and page 2, paragraph **[0012]**, lines 2-3*) comprising a spiral configuration to define a series of electric heater coils (*see, e.g., Figure 1 and page 4, paragraph **[0018]**, lines 1-5)*; and
- the electric heater coils and the water tube coils having a common axis of curvature (*see, e.g., Figure 1)* and each of the series of electric heater coils being in intimate relationship with only two adjacent coils of the water tube coils(*see, e.g., Figure 1 and page 4, paragraph **[0018]**, lines 1-5)*.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

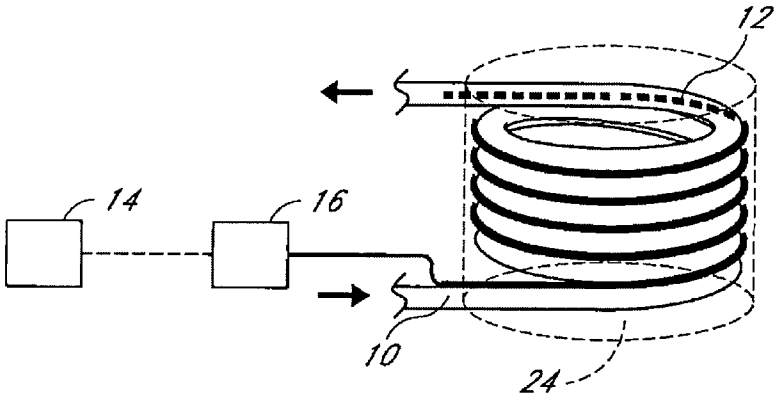
The sole grounds of rejection before the Board is whether the subject matter of each of Claims 1, 2, 4 and 6-25 is rendered unpatentable by the combination of EP 350453 issued to Christophers (hereinafter "Christophers" and attached as Exhibit B), U.S. Patent No. 3,711,681 issued to Leuschner et al. (hereinafter "Leuschner" and attached as Exhibit C) and U.S. Patent No. 4,446,158 issued to English et al. (hereinafter "English" and attached as Exhibit D).

VII. ARGUMENT

For the reasons explained below, Appellant respectfully submits that the rejections of Claims 1, 2, 4 and 6-25 under 35 U.S.C. § 103 are improper and, therefore, Appellant respectfully requests reversal of the rejections. Appellant respectfully submits that a prima facie case of obviousness has not been established.

Brief Explanation of the Aspects of the Present Invention

In general, the present inventions relate to aircraft sink water heaters used in the aircraft lavatories. The heaters quickly heat a small volume of water in tube coils, which volume is sufficient to wash a user's hands. *See Abstract.* The used volume of heated water is replenished between uses by heating such that the water heater can be thought to have a small replenishing tank that is defined within the tube coils. The aircraft sink water heater was designed to provide a compact water heating system for intermittent, small volume usage. *[0004].*



As shown to the left in reproduced Figure 1 of the present application, the aircraft sink water heater comprised a water tube 10 that was coiled in a relatively tight spiral, which created a series of coils. *[0011].* The coiled tube 10 was formed with a plurality of coils such that each of the plurality of coils was engaging or close to an adjacent coil. *[0017].* The tube 10 has an inlet and the tube 10 has an outlet that can be in communication with an aircraft wash basin. *[0013].*

An electrical heater 12 was formed in a spiral coil *[0017]* and adjoined the tube 10 in good heat conductive fashion. *[0011].* The heater 12 was positioned external of the tube 10 to limit deposits that would form on the heater 12 if the heater 12 was in direct contact with the water inside of the tube 10. *[0003].* Preferably, the coils of the heater 12 were adjacent to a pair of coils of the tube 10 such that the coils of the heater 12 were positioned within the recesses defined between adjacent coils of the tube 10. *[0017].* The heater 12 extended along a substantial length of the tube (e.g., a substantial length is sufficient to contain a volume of less

than that require to contain approximately 14 ounces of water) and was in good heat conductive relation with the tube 10. *[0011]*.

Discussion of the Applied References

The obviousness rejection is based upon a combination of three references: Christophers; Leuschner; and English. Each of these references will be introduced before the basis for the rejections will be discussed.

Christophers

Christophers, which is in the German language, was relied upon solely based on the English Abstract. The title of Christophers translates to "Washbasin with Radiator." The English Abstract states:

> The radiator contains a plurality of heating pipes (5), which are situated one above another and are each bent in an approximately U-shaped fashion and are arranged below a wash stand panel (1) around a wash-basin (2). The horizontally extending heating pipes (5) are each connected at their ends to an approximately vertical supply and return line (6, 7) to form a stable unit. The said unit is fastened by means of fastening lugs or the like to the vertical wall of a building. In this way, the heating device can be installed independently of the wash stand/wash-basin.

Thus, Christophers taught a washstand 1 that contained a wash-basin 2 and that included a radiator surrounding the washbasin 2. The radiator comprised U-shaped heating pipes 5 that were connected to a flow pipe 6 and a return pipe 7 of a central heating or domestic water pipe (see EP 0 350 453 B1 – English Claim 1)

The radiator of Christophers received heated water from a heated water supply external of the radiator disclosed by Christophers. Christophers, in Claim 6, recited that an electric heating member could be inserted into one heating pipe 5. Thus, water would presumably flow around the electric heating member as it flowed through the heating pipe 5 to buffer the heat generated while also heating the water. Such a construction would result in deposits being formed on the electric heating member..

Leuschner

Leuschner taught an electric flow-through heater for making coffee. The assembly of Leuschner consisted of a water tube 3 that had an exterior surface fixed to a tubular heating body 4 along its length. To ensure consistent heat transfer relative to the prior art constructions, the

water tube 3 and the tubular heating body 4 were tightly clamped by lugs and were joined to each other by brazing 5. The heated tube of water was used to heat the carrier plate, upon which a pot of coffee or the like could be supported.

English

English taught an apparatus for making individual beverage servings. In particular, English taught regulating the flow of water through a coffee containing filter unit whereby the coffee flavor could be efficiently extracted by the flow of water through the coffee grinds while the water flow did not take an undesirable length of time. The amount of hot water created was dependent upon the amount of water initially provided. Thus, if a single cup of hot water was provided, then the flow-through coffee maker would heat all of the water that was provided (i.e., one cup) while brewing with the disclosed apparatus.

The Rejection

At the outset, Appellant submits that at least one of the applied references clearly is from nonanalogous art and Appellant also submits that the applied references are not properly combinable. In addition, even if the references were properly combinable, the combination fails to teach every limitation of the rejected claims. For at least these reasons, Appellant requests that the rejections be reversed.

Nonanalogous Reference

Nonanalogous references are not properly used in forming an obviousness rejection. In order to rely on a reference, the reference must either be in the field of endeavor of the claimed invention or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. *See In re Oetiker, 977 F.2d 1443, 1446 (Fed. Cir. 1992).*

In this case, the Examiner has applied English as a secondary reference. English teaches a single serving coffee filtration unit. The unit presumably is manually supplied with water. The unit does not have any water supply tubes or any other components related to the rejected claims. While the reference has been relied upon for a teaching of flow regulation, the coffee filter itself is regulating the flow of water. When considered as a whole, this reference has absolutely nothing to do with a small scale water heater to be used in an aircraft lavatory or a method of heating water with such a heater. Thus, given the vast differences in subject matter, English properly is considered nonanalogous art.

In addition, English is not reasonably pertinent to the problems being solved by the claimed inventions. The claimed inventions were directed to reducing the volume of heated water and to reducing the overall size of the water heater. The claimed inventions heated a small volume of a water intermittently such that, upon use of the heated volume, a new heated volume was created during the typical period of time between successive uses. Creating a single serving coffee filtration unit is not reasonably pertinent to these problems or any other problems being solved by the claimed inventions.

Thus, Appellant respectfully submits that English is not analogous art and is not properly usable in formulating the present rejections.

The Combination is an Improper Use of Hindsight

Assuming solely for the sake of argument that English is considered suitable for formulating the present rejections, the rejections are based upon an improper combination of references. With proper references, a *prima facie* case of obviousness can only be shown when, among other criteria, there is some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *See M.P.E.P. § 2143.*

As explained in M.P.E.P. § 2141.01, the references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure. *See In re Vaeck, 947 F.2d 488 (Fed. Cir. 1991).* Thus, the references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention. *See Hodosh v. Block Drug Co., 786 F.2d 1136, 1143 (Fed. Cir. 1986).* The present rejections are based upon a combination of references that require rather substantial leaps in logic to combine.

As explained above, the rejected claims recite a water heating apparatus for use with aircraft wash basins and a method of heating water for aircraft wash basins. The primary reference, Christophers, taught a space heating radiator that supported a water basin. Leuschner, one of the secondary references, taught a flow through heater for a coffee maker hot plate. English, the other of the secondary references, taught a single use coffee filter configuration. Briefly stated, absent hindsight, Appellant respectfully submits that one of ordinary skill in the

art wishing to design a small scale water heating device for use on airplanes would not start with a space heating radiator and modify it with the teachings of a hot plate and a coffee filter to arrive at the claimed inventions. Nothing in the references or the prior art in general suggest the desirability of making the combination as set forth in the rejections.

In Christophers, the radiator was connected by an inlet and an outlet to a hot water supply, such as a building's hot water system, and included multiple tubes that extended in parallel with each other, as opposed to extending in series, between the inlet and the outlet. In addition, the water in the radiator was not supplied to the water basin. The water basin simply was supported by the radiator.

Leuschner has been combined with Christophers. Leuschner taught a flow through water heater for a coffee maker hot plate. The supposed teaching or suggestion for the combination was to use the flow through heater to lead to more effective heating of the fluid. Christophers, however, used an existing heated water supply to heat a room through multiple parallel flow paths and, it appears, also had an internal electric heater in at least one of the flow paths. The electric heater, however, was positioned inside of the flow path to allow water to carry the heat supply throughout the radiator rather that supplying heat in a single region. If the heat supply of Leuschner were used, the heat supply would be external of the water tubes and an occupant of the heated room would be more likely to be burned upon contact with the heat supply. Moreover, with an external heat source, the heat must first pass through the tube wall before coming into contact with the water. Thus, the water, which is being used to heat the room in Christophers, is not more efficiently heated by an external heater. Christophers, with its internal electric heater, was more efficient and there is no reasonable teaching or suggestion in the prior art that would lead one to combine these two references.

Further, English taught a single cup coffee filter that regulated the flow rate of coffee through the filter to result in coffee having a consistent strength from one cup to the next. The reference taught treating just enough water, such as through a "Mr. Coffee," to create one cup of coffee at a time, presumably when one cup of water was provided. The supposed suggestion for combining English with the references above was to limit the heating volume. Again, the primary reference was a radiator for space heating. One of ordinary skill in the art would not likely be led to modify a space heating radiator to have a small volume of water used to heat the

space, especially given the need for a large amount of heat transfer required to heat a small room. There is no reasonable teaching or suggestion in the prior art that would lead to combining English with the other two applied references to obtain the recited water heaters.

In short, the claims in the present application each recite a water heater for use with an aircraft wash basin or a method of heating small volumes of water or intermittent usage in an aircraft wash basin. The claims have been rejected based upon a combination of: (1) a space heating radiator that is connected into a hot water system of a building; (2) a hot plate heating element that uses a tubular heating body to heat water for heating the hot plate; and (3) a single cup coffee filter. The only reasonable basis for combining these references is Appellant's own disclosure, which is an improper use of hindsight.

The Applied Combination Renders Christophers Changes the Principle of Operation

Moveover, the applied combination impermissibly changes the principle of operation of Christophers. As explained above, the primary reference, Christophers, taught a room heating radiator, which is commonly used to supply heat to a small room. Thus, heated water, supplied from a building heated water supply or heated by an internal electric heater, would be passed through the tubular members to heat the room. There was no teaching of supplying the heated water to the wash basin.

To make this modification would require significant changes to the operating principles of the closed circuit water flow path taught by Christophers. For instance, heating a constantly moving water flow involves different controls that heating an intermittently moving volume of water. Transitioning Christophers to a water heater for water to be supplied to the wash basin would require temperature controls, such as a thermostat or the like, which were not used in the simple structure taught by Christophers.

Moreover, as explained above, English taught passing only a single cup of water through a coffee maker such that a single cup of coffee could be made. Appellant submits that passing only a single cup of water through Christophers' room heating radiator would render the radiator inoperable as well due to the small amount of heat carried by the system and available for heat transfer into the room. For at least these reasons, modifying Christophers such that it is a water heater for intermittent use and not a radiator that supports a wash basin would impermissibly change the principle of operation of Christophers.

The References Fail to Teach or Suggest Every Limitation

Assuming solely for the sake of argument that the references are properly combinable, a *prima facie* case of obviousness still has not been established. As is well known, the prior art references, when combined, must teach or suggest all the claim limitations. *See M.P.E.P. § 2143.* In this case, many different limitations are not taught by any applied reference. Therefore, the combination also could not teach those limitations.

Claim 1

Claim 1 recites, among other limitations, a tube comprising a plurality of coils with each coil engaging or being close to an adjacent coil. None of the three applied references taught or suggested coils.

Christophers taught four U-shaped members connected to a common inlet and a common outlet. Thus, the flow did not circular from one U-shaped member to the next in a serpentine manner. In other words, the heated water did not flow through the U-shaped members in series. Rather, the heated water flowed through the U-shaped members in parallel. Christophers did not teach coils, let alone a plurality of coils with each coil engaging or being close to an adjacent coil.

Leuschner also did not teach a plurality of coils with each coil engaging or being close to an adjacent coil. Rather, Leuschner only taught a single tube that was bent back upon itself to form a single loop. Thus, Leuschner failed to teach or suggest a tube comprising a plurality of coils with each coil engaging or being close to an adjacent coil.

English also failed to teach or suggest a tube comprising a plurality of coils. English did not teach a tube and therefore could not have taught a coiled tube.

Thus, none of the applied references taught a tube comprising a plurality of coils with each coil engaging or being close to an adjacent coil. Because none of the applied references taught a tube comprising a plurality of coils with each coil engaging or being close to an adjacent coil, the combination of the three applied references also did not teach such a construction.

Similarly, all three references failed to teach or suggest a heater comprising coils. Only Leuschner taught an external heater and the heater of Leuschner was bent back upon itself to form a single loop. The only heater taught by Christophers was disposed inside the tube.

English did not teach a heater. Thus, none of the applied references taught a heater comprising coils and, therefore, the combination could not have taught such a construction.

Because none of the applied references taught a coiled tube or a coiled heater, none of the references taught or suggested each heater coil being adjacent to a pair of adjacent tube coils but not encircling an axis of the tube. Thus, the combination of the references did not teach or suggest such a construction.

Finally, none of the applied references taught that the substantial length of the tube along which the heater extended was a length that defined a volume of less than that required to contain approximately 14 ounces of water. Irrespective of whether the limitations relating to an aircraft are limiting or not, and irrespective of whether the limitations relating to the specific volume are limiting, none of the applied references taught limiting the length of the tube along which the heater extended based upon the volume contained therein.

For all of these reasons, Appellant submits that Claim 1 is patentable over the applied combination.

Claim 4

Claim 4 depends from Claim 1 and further recites that the tube has a circular exterior cross-section such that the sections create a recess between the sections and that the heater is positioned in the recess.

Regardless of whether the applied references taught a tube having a circular exterior cross-section, none of the applied references taught the plurality of coils needed to create the recess nor that the heater was positioned in the recess. Leuschner, the only reference that taught an external electric heater, taught an electric heater that was positioned in vertically overlapping relationship with the tube. Thus, none of the references taught the recited construction.

For all of these reasons, in addition to the reasons discussed above with respect to Claim 1, Appellant submits that Claim 4 is patentable over the applied combination.

Claims 6 and 7

Claims 6 and 7 depend from Claim 1 and further recite, respectively, that the heater coils are on the outside of the tube coils and that the heater coils are on the inside of the tube coils. These constructions are shown in Figures 1 and 5 respectively.

None of the applied references taught the plurality of coils of either the tube or the heater. For at least this reason, none of the applied references taught the relative positioning between the heater coils and the tube coils. Thus, none of the references taught the recited construction.

For these reasons, in addition to the reasons discussed above with respect to Claim 1, Appellant submits that Claims 6 and 7 are patentable over the applied combination.

Claim 8

Claim 8 depends from Claim 1 and further recites that the tube and the heater define a tubular bundle of coils.

None of the applied references taught any tube coils or any heater coils. Accordingly, none of the applied references taught a bundle of coils defined by a tube and a heater. For at least this reason, none of the references taught the recited construction.

For this reason, in addition to the reasons discussed above with respect to Claim 1, Appellant submits that Claim 8 is patentable over the applied combination.

Claim 9

Claim 9 depends from Claim 1 and further recites that the tube and the heater is each formed with a plurality of coils that are sufficiently large to extend around the exterior of a lower portion of a wash basin.

Again, none of the applied references taught a tube or a heater that was formed with a plurality of coils. Thus, regardless of whether any reference taught positioning a tube around an exterior of a wash basin, none of the applied references taught the recited construction.

For this reason, in addition to the reasons discussed above with respect to Claim 1, Appellant submits that Claim 9 is patentable over the applied combination.

Claim 14

Claim 14 recites a tube that is connected to a water outlet. Christophers taught a tube that was connected to a supply pipe and a return pipe. The water flowing through the radiator of Christophers did not exit the water system than any water outlet connected to the tube. Thus, Christophers did not teach such a construction.

Leuschner also did not teach a tube that was connected to a water outlet. Leuschner et al. taught a connection among a water tube 3, a tubular heating body 4 and a carrier plate 1. Thus, Leuschner did not teach the recited construction.

English did not teach any tubes or any water outlets. Thus, English did not teach the recited construction.

Because none of the applied references taught a tube that was connected to a water outlet, the combination of the references also failed to teach such a construction.

Further, none of the applied references taught a tube and an electric heater that were in contact over a length that defined a volume of less than that required to contain approximately 14 ounces of water such that a user on an aircraft can obtain a supply of heated water having a volume of less than approximately 14 ounces before the water heater begins heating a new supply of heated water. As explained above, Christophers did not teach an electric heater at all, Leuschner did not teach the limited contact length and English did not teach any tubes, heaters or contact between the two. Because none of the applied references taught the recited construction, the recited combination did not teach such a construction.

For all of these reasons, Appellant submits that Claim 14 is patentable over the applied combination.

Claim 15

Claim 15 depends from Claim 14 and further recites providing the tube and the heater with coils with the heater coils being in good heat conductive relation with adjacent tube coils.

None of the applied references taught a tube and a heater with coils such that the heater coils can be in good heat conductive relation with adjacent tube coils. Leuschner, the only reference that taught an electric heater, taught an electric heater that was a single loop. Thus, none of the references taught the recited construction.

For all of these reasons, in addition to the reasons discussed above with respect to Claim 14, Appellant submits that Claim 15 is patentable over the applied combination.

Claim 16

Claim 16 depends from Claim 15 and further recites applying electrical energy to the heater to heat less than 14 ounces of water in the tube to at least about 115° F in no more than about three minutes.

None of the applied references taught heating less than 14 ounces of water in the tube to at least about 115° F in no more than about three minutes. Leuschner, the only reference that

taught an electric heater, taught an electric heater that was a single loop and did not teach the temperature, the volume or the time recited by Claim 16. Thus, none of the references taught the recited method.

For all of these reasons, in addition to the reasons discussed above with respect to Claim 14 and Claim 15, Appellant submits that Claim 16 is patentable over the applied combination.

Claim 17

Claim 17 depends from Claim 14 and further recites that the coil has an inlet and an outlet with the outlet being in fluid communication with the aircraft wash basin.

None of the applied references taught a tube having an outlet that was in fluid communication with an aircraft wash basin. Christophers taught a radiator in which the radiator was supplied with heated water from a building water heating system and that water was returned to the water heating system. To supply the water to the wash basin would require a steady flow of heated water from the radiator into the wash basin, such that the temperature of the water in the radiator would be not maintained to a level sufficient for use in heating the room. Leuschner did not teach having an outlet that was in fluid communication with an aircraft wash basin and English did not teach a tube, let alone an outlet. Thus, none of the references taught the recited construction.

For all of these reasons, in addition to the reasons discussed above with respect to Claim 14, Appellant submits that Claim 17 is patentable over the applied combination.

Claim 18

Claim 18 depends from Claim 17 and further recites that the water outlet empties into the aircraft wash basin.

None of the applied references taught a water outlet that emptied heated water into an aircraft wash basin. As explained directly above, Christophers taught a radiator in which the radiator was supplied with heated water from a building water heating system and that water was returned to the water heating system. To supply the water to the wash basin would require a steady flow of heated water from the radiator into the wash basin, such that the temperature of the water in the radiator would not be maintained to a level sufficient for use in heating the room. Leuschner did not teach having an outlet that was in fluid communication with an aircraft wash

basin and English did not teach a tube, let alone an outlet. Thus, none of the references taught the recited construction.

For all of these reasons, in addition to the reasons discussed above with respect to Claim 14 and Claim 17, Appellant submits that Claim 18 is patentable over the applied combination.

Claim 19

Claim 19 recites a water tube comprising a spiral configuration to define a series of water tube coils. None of the applied references taught such a construction. Christophers taught a plurality of U-shaped tubes arranged in parallel. Leuschner et al. taught a water tube with a single loop. English did not teach any water tube. Thus, none of the applied references taught such a construction and, therefore, the combination could not have taught such a construction.

Claim 19 also recites an electric heater that comprises a spiral configuration to define a series of electric heater coils. Again, none of the applied references taught such a construction. Neither Christophers nor English taught any electric heater. The electric heater taught by Leuschner was not in a spiral configuration such that it defined a series of electric heater coils.

Given that the applied references failed to teach these two constructions, the applied references also failed to teach that the heater coils and the water tube coils have a common axis of curvature and that each of the series of electric heater coils is in intimate relationship with only two adjacent coils of the water tube coils. Thus, the applied combination failed to teach this construction as well.

For all of these reasons, Appellant submits that Claim 19 is patentable over the applied combination.

Claims 20 and 21

Claims 20 and 21 depend from Claim 19 and further recite, respectively, that the heater coils are positioned solely to the outside of the water tube coils and the heater coils are positioned solely to the inside of the water tube coils. These constructions are shown in Figures 1 and 5 respectively.

None of the applied references taught the plurality of coils of either the tube or the heater. For at least this reason, none of the applied references taught the relative positioning between the heater coils and the tube coils. Thus, none of the references taught the recited construction.

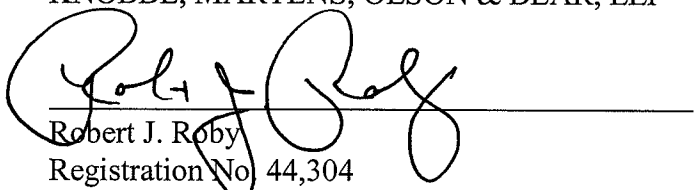
For these reasons, in addition to the reasons discussed above with respect to Claim 19, Appellant submits that Claims 20 and 21 are patentable over the applied combination.

VIII. CONCLUSION

For the reasons set forth above, Appellants respectfully submit that the rejections of Claims 1, 2, 4 and 6-25 are improper, and request that these rejections be reversed.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP



Robert J. Roby
Registration No. 44,304
Attorney of Record
Customer No. 20,995
(949) 760-0404

CLAIMS APPENDIX

1. (Previously Presented) A water heating apparatus for use with a wash basin on an aircraft, the apparatus comprising:

a tube made of good heat conductive material, said tube comprising a plurality of coils with each coil engaging or being close to an adjacent coil;

an electric heater extending along a substantial length of said tube in good heat conductive relation with the tube, said heater being positioned exterior to said tube such that deposits do not form on said heater, said heater comprising coils with each heater coil being adjacent a pair of adjacent tube coils but not encircling an axis of said tube; and

said substantial length of said tube defining a volume of less than that required to contain approximately 14 ounces of water such that a user on the aircraft can obtain a supply of heated water having a volume of less than approximately 14 ounces before the water heater begins heating a new supply of heated water.

2. (Original) The apparatus of Claim 1, wherein the heater is brazed to the tube or joined to the tube with a heat conductive epoxy.

3. (Cancelled)

4. (Previously Presented) The apparatus of Claim 1, wherein said tube has a circular exterior cross-section such that said sections create a recess between said sections, and said heater is positioned in said recess.

5. (Cancelled)

6. (Previously Presented) The apparatus of Claim 1, wherein the heater coils are on the outside of the tube coils.

7. (Previously Presented) The apparatus of Claim 1, wherein the heater coils are on the inside of the tube coils.

8. (Previously Presented) The apparatus of Claim 1, wherein the tube and the heater define a tubular bundle of coils.

9. (Original) The apparatus of Claim 1, wherein said tube and said heater are each formed with a plurality of coils which are sufficiently large to extend around the exterior of a lower portion of a wash basin.

10. (Previously Presented) The apparatus of Claim 9, including the wash basin, wherein the wash basin is sized and configured for placement in the aircraft.

11. (Previously Presented) The apparatus of Claim 1, wherein said heater configured to supply sufficient heat about 60° F to about 115 ° F in about three minutes.

12. (Original) The apparatus of Claim 11, wherein said tube has an outer diameter of about ¾ of an inch and a length of about 74 inches.

13. (Original) The apparatus of Claim 12, wherein said tube is made of copper or stainless steel.

14. (Previously Presented) A method of heating small volumes of water for intermittent usage in a wash basin on an aircraft, said method comprising:

providing a tube to be connected to a water outlet, said tube being made of good heat conductive material;

providing an electric heater in good heat conductive relation with the tube, said tube and said electric heater being in contact over a length that defines a volume of less than that required to contain approximately 14 ounces of water such that a user on the aircraft can obtain a supply of heated water having a volume of less than approximately 14 ounces before the water heater begins heating a new supply of heated water.

15. (Original) The method of Claim 14 comprising:

providing said tube and said heater with coils, with said heater coils being in good heat conductive relation with adjacent tube coils.

16. (Previously Presented) The method of Claim 15 comprising:

applying electrical energy to the heater to heat less than about 14 ounces of water in said tube to at least about 115° F in no more than about three minutes.

17. (Previously Presented) The apparatus of Claim 1, wherein said coil has an inlet and an outlet and said outlet is in fluid communication with said aircraft wash basin.

18. (Previously Presented) The method of Claim 14, wherein said water outlet empties into said aircraft wash basin.

19. (Previously Presented) An aircraft sink water heater comprising a water tube, the water tube comprising an inlet and an outlet, the water tube comprising a spiral configuration to define a series of water tube coils, an electric heater comprising a spiral configuration to define a

series of electric heater coils, the electric heater coils and the water tube coils having a common axis of curvature and each of the series of electric heater coils being in intimate relationship with only two adjacent coils of the water tube coils.

20. (Previously Presented) The aircraft sink water heater of Claim 19, wherein the electric heater coils are positioned solely to the outside of the water tube coils.

21. (Previously Presented) The aircraft sink water heater of Claim 19, wherein the electric heater coils are positioned solely to the inside of the water tube coils.

22. (Previously Presented) The aircraft sink water heater of Claim 19, wherein the electric heater extends along substantially the entire length of the series of water tube coils.

23. (Previously Presented) The aircraft sink water heater of Claim 19, wherein the water tube is formed of a potable water compatible material.

24. (Previously Presented) The aircraft sink water heater of Claim 19, wherein the electric heater is insulated with a lightweight insulating material.

25. (Previously Presented) The aircraft sink water heater of Claim 19 further comprising a temperature responsive switch positioned within the water tube coils, the temperature responsive switch being in electrical communication with the electric heater.

IX. EVIDENCE APPENDIX

A. Copy of the Present Application as Filed
B. Copy of Christophers
C. Copy of Leuschner
D. Copy of English

X. RELATED PROCEEDINGS APPENDIX

None

EXHIBIT A

AIRCRAFT WATER HEATING SYSTEM

[0001] This application claims the benefit of U.S. Provisional Application no. 60/412102, filed September 19, 2002.

Field of the Invention

[0002] This invention relates to water heaters and particularly to an electric water heating system for an aircraft or other applications in which similar requirements and limitations exist.

Background of the Invention

[0003] Heated water is customarily provided in commercial aircraft lavatories for hand-washing purposes. There are a number of requirements for such systems that place many limitations on the designs which can be satisfactorily employed. A suitable system should provide the needed heated water in as efficient manner as possible. The amount of electrical power needed for heating should be limited since aircraft attempt to minimize the amount so as to minimize the weight and cost of equipment. Likewise, the cost and weight of the water heating components should also be minimized. Related to costs, repair and replacement expenses are always of importance.

[0004] One widely used system accomplishes some of these goals but also has certain deficiencies. That system employs a tank containing two or more electrical heaters immersed in water. A major shortcoming of that system is that the water in contact with the heater is heated to a high temperature, possibly even boiling, with the undesirable consequence that calcification or other impurities form mineral deposits on the heater. Also this can be a concern due to overheating, creating a pressure vessel. The deposits are not good thermal conductors and hence additional power is required to heat the water. Further, the deposits hasten the need to replace the heaters or the entire unit. The container also has somewhat greater volume than is needed based upon usage analysis. The water heater containment vessel has to be designed and manufactured as a "pressure vessel" due to potential steam pressure. Additionally, unit cost is high.

Summary of the Invention

[0005] Briefly stated, the invention provides a compact water heating system for intermittent, small volume usage, such as for aircraft wash basins or similar applications. The system employs a tube, preferably coiled, and an electric heater in good heat transfer relation with the tube. Since the volume demand is small and intermittent for typical aircraft wash basin usage, and the water temperature desired is relatively low, no large reservoir of high temperature water is needed.

Brief Description of the Drawings

[0006] Fig. 1 is a schematic, perspective view of one embodiment of a water heater system.

[0007] Fig. 2 is a plan view thereof.

[0008] Fig. 3 is a schematic, perspective view of another embodiment of a water heater coiled around a sink basin.

[0009] Fig. 4 is a plan view of the heater of Fig. 3.

[0010] Fig. 5 is a schematic, perspective view of another embodiment of the invention.

[0011] Fig. 6 is a plan view of the embodiment of Fig. 5.

Detailed Description of the Preferred Embodiment

[0012] Referring to Fig. 1, there is illustrated a water tube 10 coiled in a relatively tight spiral creating a series of coils. An electrical heater 12 adjoins the tube in good heat conductive fashion. For example, the heater may be brazed to the tube or joined by a good heat conductive epoxy. The heater preferably extends along most of the length of the tube coils to efficiently heat the water in the tube. The heater may be any readily available electric tubular heater having a resistance heating element surrounded by electrically insulating, heat conductive material. The heater is connected to a suitable source 14 of electric power, and a temperature responsive switch 16 to limit the maximum water temperature.

[0013] The water tube is preferably made of copper or stainless steel or another thermal conducting and potable water compatible material. Stainless steel is a good thermal conductor. It is non-contaminating to water and is not corroded by water. Stainless steel is

very durable, and is also very ductile so that it can be formed to fit into space-saving configurations. This, of course, is very important for aircraft usage where minimizing space needs is very important. The tightly curved tube illustrated in Figure 1 is a relatively compact structure and does not take a large amount of space. For example, the coil diameter may only be three or four inches. On the other hand, because stainless steel or copper is easily formed, a heater 20 can be positioned around the lower portion of a sink basin 22, for example, as is illustrated in Figures 3 and 4, wherein the water heater may occupy space that is otherwise not used. The overall design is simple and long-lasting.

[0014] Another advantage of the system illustrated is that the length of tubing required is not very great in that the water usage demands are very low. Typically, aircraft lavatories have an automatic shut-off of the water supply 4 to 6 seconds after the user pushes the water dispensing button on the faucet. A typical user will push the button twice while washing hands to obtain two short bursts of water. In most aircraft systems, this is less than a pint and it is believed that only about 11 ounces is needed. It has also been found that a typical interval between users of an aircraft lavatory sink is seldom less than three minutes. In other words, it is only necessary to supply about 11 ounces of heated water about every 3 minutes.

[0015] Also, the system is not so much a hot water system as it is a warm water system. That is, the temperature of the water coming out of the tap for current systems is no more than about 115°F. It has been found that with the above-described heater, it is only necessary to employ a short length of tubing with the corresponding heater joined to it. The volume of water stored within the tube is sufficient to satisfy the needs without a separate storage container, that is, most of the heated water is depleted by a single user. That amount of unheated water is then heated to the necessary temperature within about three minutes. Note that the unheated water is typically already about 60°F.

[0016] More specifically, the parameters of a prototype system that satisfies typical aircraft needs employs about 74 inches of tubing with the corresponding length of electrical heater bonded to the tubing. The tubing external diameter is about ¾ inch while the tubing wall thickness is about 1/32 inch. The power required to heat 60°F water to about 115°F is approximately 400 watts. A system of that size provides about 14 ounces of water.

[0017] Minimizing electrical demands is of course also important on an airplane so as to minimize the cost and weight of power-generating equipment and to minimize the necessary fuel to produce the power. To further minimize electrical consumption and thermal losses, the heating coil may be insulated with a suitable lightweight insulating material. Further, the coil bundle can be encased in another enclosure 24 (Fig. 1) that helps conserve heat and protects the heater from its surroundings. The switch 16 and other electrical controls can be positioned within the coil bundle shown in Fig. 1.

[0018] The heater 12 is schematically illustrated in the drawings with each of its coils positioned in the recess formed between adjacent tube coils in intimate relation with those two coils. The heater coils are shown extending around the exterior of the tube coils, but the heater coils could be on the interior of the tube coils, as shown in Fig. 5. Also any electric controls could be positioned within the tube bundle, as shown in Fig. 6.

[0019] This heating system does not fall into the category of a "pressure vessel." Thus it results in a safe and economical approach.

[0020] This design promotes easy maintenance and cleaning. The water heater can be chemically cleaned in situ or can be cleaned with a brush without having to disassemble the water heater assembly.

[0021] While the invention has been shown and described with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention.

WHAT IS CLAIMED IS:

1. A water heating apparatus comprising:

a tube made of good heat conductive material; and

an electric heater extending along a substantial length of said tube in good heat conductive relation with the tube.

2. The apparatus of Claim 1, wherein the heater is brazed to the tube or joined to the tube with a heat conductive epoxy.

3. The apparatus of Claim 1, wherein said tube includes first and second sections that are in engagement with or close to each other; and said heater extends along and engages both of the tube sections.

4. The apparatus of Claim 3, wherein said tube has a circular exterior cross-section such that said sections create a recess between said sections, and said heater is positioned in said recess.

5. The apparatus of Claim 1, wherein said tube comprises a plurality of coils with each coil engaging or being close to an adjacent coil; and said heater comprises coils with each heater coil being adjacent a pair of adjacent tube coils.

6. The apparatus of Claim 5 wherein the heater coils are on the outside of the tube coils.

7. The apparatus of Claim 5 wherein the heater coils are on the inside of the tube coils.

8. The apparatus of Claim 1, wherein the tube and the heater are each formed with a plurality of coils wound on a small diameter, consistent with the tube construction and heater materials, and forming a tubular bundle of coils.

9. The apparatus of Claim 1, wherein said tube and said heater are each formed with a plurality of coils which are sufficiently large to extend around the exterior of a lower portion of a wash basin.

10. The apparatus of Claim 9, including the wash basin.

11. The apparatus of Claim 1, wherein said tube and said heater are configured to heat at least 14 ounces of water from a temperature of about 60° F to about 115 ° F in about three minutes.

12. The apparatus of Claim 11, wherein said tube has an outer diameter of about ¾ of an inch and a length of about 74 inches.

13. The apparatus of Claim 12, wherein said tube is made of copper or stainless steel.

14. A method of heating small volumes of water for intermittent usage, such as for an aircraft wash basin, said method comprising:

providing a tube to be connected to a water outlet, said tube being made of good heat conductive material;

providing an electric heater in good heat conductive relation with the tube.

15. The method of Claim 14 comprising:

providing said tube and said heater with coils, with said heater coils being in good heat conductive relation with adjacent tube coils.

16. The method of Claim 15 comprising:

applying electrical energy to the heater to heat at least about 14 ounces of water in said tube to at least about 115° F in no more than about three minutes.

AIRCRAFT WATER HEATING SYSTEM

Abstract of the Disclosure

An aircraft sink water heater includes an electric heater with coils engaging water tube coils. The system quickly heats a small volume of water in the tube coils, sufficient to wash a user's hands.

[H:\DOCS\GHO\GHO-5492.DOC 091902]

H:\DOCS\GHO\GHO-6548.DOC,bg2
091503

FIG. 2

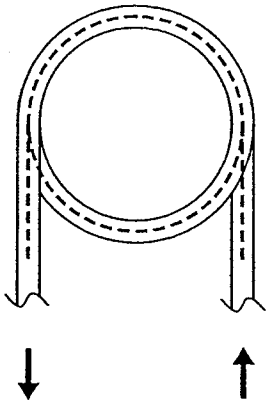


FIG. 4

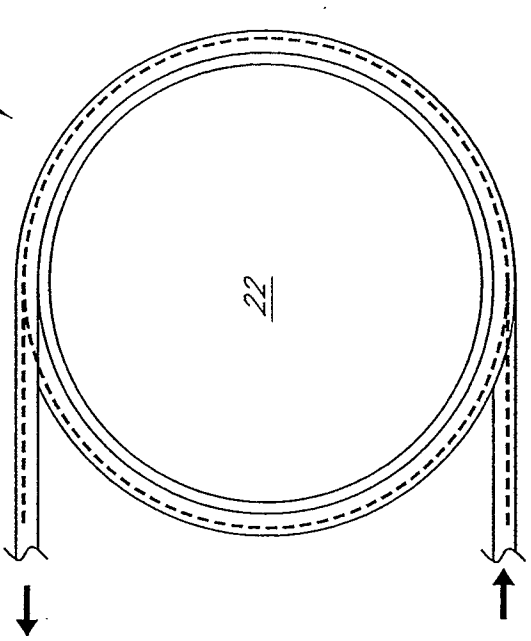


FIG. 1

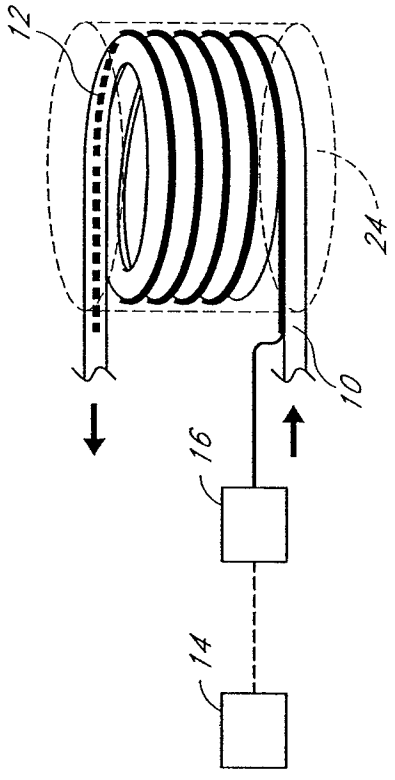
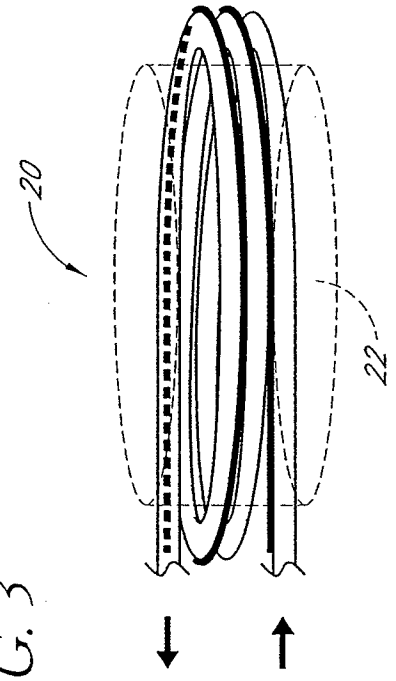


FIG. 3



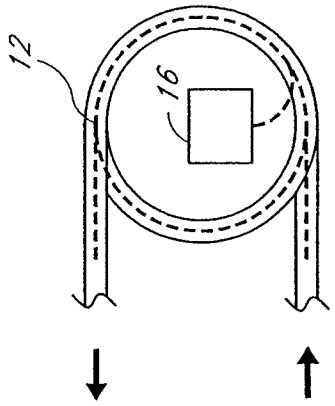


FIG. 6

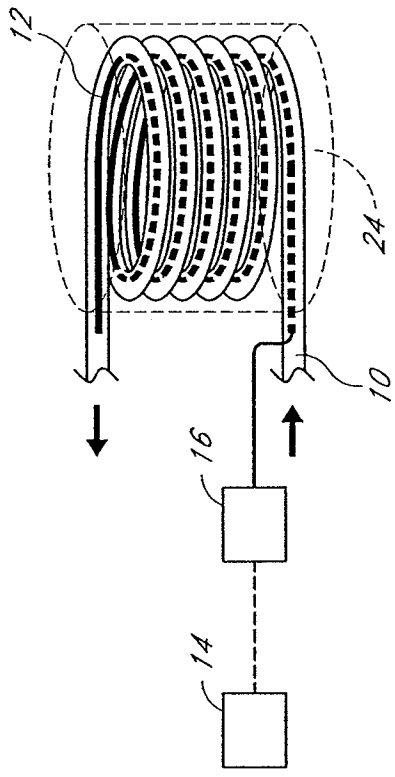


FIG. 5

EXHIBIT B

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Veröffentlichungsnummer: **0 350 453 A1**

(12) # EUROPÄISCHE PATENTANMELDUNG

(21) Anmeldenummer: **89810505.1**

(22) Anmeldetag: **04.07.89**

(51) Int. Cl.5: **F 28 D 1/047**
A 47 K 10/06

(30) Priorität: **08.07.88 CH 2605/88**

(43) Veröffentlichungstag der Anmeldung:
10.01.90 Patentblatt 90/02

(84) Benannte Vertragsstaaten:
AT CH DE FR IT LI

(71) Anmelder: **ARBONIA AG**
Industriestrasse 23
CH-9320 Arbon (CH)

(72) Erfinder: **Christophers, Richard**
Sonnenbergstrasse 51 c
D-7000 Stuttgart (DE)

(74) Vertreter: **Bosshard, Ernst**
Schulhausstrasse 12
CH-8002 Zürich (CH)

(54) **Heizkörper.**

(57) Der Heizkörper enthält mehrere übereinanderliegende, je etwa U-förmig gebogene Heizrohre (5), die unterhalb einer Waschtischplatte (1) um eine Waschbecken (2) herum angeordnet sind. Die horizontal verlaufenden Heizrohre (5) sind an ihren Enden je mit einer etwa vertikalen Vorlauf- und Rücklaufleitung (6, 7) zu einer stabilen Einheit verbunden. Diese Einheit wird durch Befestigungslaschen od.dgl. an der Vertikalwand eines Gebäudes befestigt. Dadurch kann die Heizeinrichtung unabhängig vom Waschtisch/Waschbecken montiert werden.

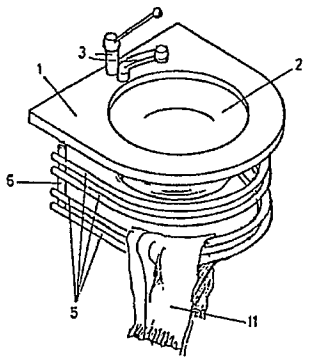


Fig 4.

EP 0 350 453 A1

Beschreibung

Heizkörper

Die Erfindung bezieht sich auf einen Heizkörper mit flüssigkeitsführenden Heizrohren.

Bei räumlich engen Badezimmern ist es oftmals schwierig, konventionelle Heizkörper anzubringen, wenn geeignete und ausreichend grossen Wandflächen fehlen.

Mit der Erfindung soll die Aufgabe gelöst werden, einen Heizkörper zu schaffen, der sich in Badezimmern od.dgl. durch seine Formgebung besonders platzsparend unterbringen lässt.

Diese Aufgabe wird durch einen Heizkörper gelöst, der mehrere übereinanderliegende, im wesentlichen die gleiche bogenförmige Gestalt aufweisende Heizrohre mit quer zu den Heizrohren verlaufenden Vorlauf- und Rücklauf-Rohrstücken zu einer Einheit verbunden sind, und Befestigungsorgane vorhanden sind, mit denen diese Einheit unterhalb eines Waschtisches mit Waschbecken an einer Wand oder am Waschtisch befestigbar ist.

Dadurch lässt sich der Raum unterhalb der Waschtischplatte zur Aufnahme des Heizkörpers ausnützen. Die Wärmestrahlung wirkt dabei in angenehmer Weise direkt auf eine vor dem Waschtisch stehende Person. Da somit keine Wandfläche für die Anordnung des Heizkörpers benötigt wird, besteht eine erhöhte Freiheit zum Aufstellen von Möbeln od.dgl. im betreffenden Raum.

In der Zeichnung ist ein Ausführungsbeispiel des Erfindungsgegenstandes dargestellt und wird nachfolgend beschrieben. Es zeigen:

Fig. 1 eine perspektivische Gesamtansicht eines Waschtisches mit Waschbecken mit erfindungsgemässem Heizkörper

Fig. 2 eine perspektivische Ansicht eines die Heizrohre teilweise überdeckenden Abdeckbleches

Fig. 3 eine perspektivische Ansicht der Heizrohre mit Trägerorganen

Fig. 4 eine perspektivische Darstellung einer Ausführungsform zur direkter Befestigung an einer Vertikalwand

Gemäss Fig. 1 ist in eine Waschtischplatte 1 ein Waschbecken 2 eingelassen. Waschtisch 1 und Waschbecken 2 können entweder aus zwei miteinander verbundenen Teilen bestehen oder einteilig ausgeführt sind. Für die Wasserzufuhr zum Waschbecken 2 ist eine übliche Armatur 3 vorhanden. Unter der Waschtischplatte 1 ist ein an dieser befestigtes Abdeckblech 4 vorhanden, welches Heizrohre 5 entweder aussen oder innen umgibt. Mehrere dieser horizontal verlaufenden Heizrohre (5) sind übereinander angeordnet und je an einem gemeinsamen Vorlauf- und Rücklauf-Rohrstück 6, 7 durchflussverbunden angeschlossen. Diese im wesentlichen U-förmigen Heizrohre 5 liegen - von oben gesehen -deckungsgleich übereinander. Mit den beiden Enden der Rohrstücke ist ein Träger 8 in Form eines Rahmens oder Haltebleches verbunden, von dem ein Befestigungswinkel 9 abragt zur Befestigung an einer Vertikalwand des Gebäudes. Die Heizrohre 5 bilden zusammen mit den Vorlauf- und Rücklauf-Rohrstücken 6, 7 und dem Halteblech 8 eine stabile Einheit, welche vom Waschtisch 1 und vom Waschbecken 2 getrennt als einbaufertige Einheit herstellbar und montierbar ist. Der Rand des Waschtisches 1 ist über diese Einheit radial vorstehend ausgebildet.

Das aus Fig. 3 ersichtliche, etwa halbkreisförmig gebogene Abdeckblech 4 wird über die Heizrohre 5 geschoben und mit dem Träger 8 verbunden. Die Befestigung mit der Unterseite der Waschtischplatte 1 erfolgt durch vom obern Rand abragende, einwärts gerichtete Haltelappen 10. Zwei weitere Befestigungslaschen 14 sind zur Montage an einer Vertikalwand oder am Halter 8 bestimmt.

Die Vorlauf- und Rücklauf-Rohrstücke 6, 7 werden über konventionelle Muffen an ein übliches Zentralheizungsrohrnetz oder an eine Brauchwarmwasseranlage angeschlossen. Für die Uebergangszeit könnte auch eine elektrische Heizschlange oder ein Heizstab in mindestens eines der Heizrohre 5 eingebaut sein, deren elektrische Anschlüsse auf einen seitlich angeordneten Anschluss- und Schaltkasten 12 geführt sind.

Bei der Ausführungsform nach Fig. 4 sind die Heizrohre 5 untereinander durch die Vorlauf- und Rücklauf-Rohre 6, 7 zu einer Einheit verbunden. Die Verbindung mit einer Vertikalwand des Gebäudes erfolgt durch Rohrschellen od.dgl. oder indem die Rohre 6, 7 selbst mit Verbindungsorganen versehen sind. Zwischen der Waschtischplatte 1 und dem Waschbecken 2 besteht zur erwähnten Einheit je ein Abstand. Dadurch können die sanitären Installationen unabhängig vom Heizkörper montiert werden. Dies lässt sich auch beim Abdeckblech 4 durchführen, indem dieses ebenfalls nur an der Vertikalwand befestigt wird.

Die Waschtischplatte 1 und das Waschbecken 2 können aus den üblichen hiefür verwendeten Materialien bestehen. An Stelle von Rohren mit rundem Querschnitt könnten auch Flachrohre verwendet werden.

Wie aus Fig. 4 ersichtlich ist, lassen sich durch Anordnung eines radialen Abstandes zu benachbarten Rohren 5 oder vom Waschtisch Handtuchstangen anordnen, auf denen sich Handtücher 11 od.dgl. vorwärmen oder trocknen lassen.

Patentansprüche

1. Heizkörper mit flüssigkeitsführenden Heizrohren, dadurch gekennzeichnet, dass mehrere übereinanderliegende, im wesentlichen die gleiche bogenförmige Gestalt aufweisende Heizrohre (5) mit quer zu den Heizrohren (5) verlaufenden Vorlauf- und Rücklauf-Rohrstükken (6, 7) zu einer Einheit verbunden sind, und Befestigungsorgane vorhanden sind, mit denen diese Einheit unterhalb eines Waschtisches (1) mit Waschbecken (2) an einer Wand und/oder am Waschtisch (1) befestigbar ist.

2. Heizkörper nach Anspruch 1, dadurch gekennzeichnet, dass die Heizrohre (5) eine im wesentlichen U-förmige Gestalt haben und deckungsgleich übereinander angeordnet sind.

3. Heizkörper nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass die Heizrohre (5) mit einem je die beiden Rohrenden aufnehmenden Träger (8) starr verbunden sind und der Träger (8) Befestigungsorgane (9) aufweist, mit denen er an einer Vertikalwand befestigbar ist.

4. Heizkörper nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass die Heizrohre (5) mit einem die beiden Rohrenden aufnehmenden Träger (8) starr verbunden sind und ein der gebogenen Rohrform folgendes Abdeckblech (4) die Heizrohre (5) auf deren Innen- oder Aussenseite überdecken, und dieses Abdeckblech (4) Befestigungsorgane (10, 14) zur Befestigung an einer Vertikalwand und am Waschtisch (1) enthält.

5. Heizkörper nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass die Befestigungsmittel mit den Vorlauf- und Rücklauf-Rohrstücken (6) starr verbunden oder als Teil derselben ausgebildet und zur Befestigung an einer Vertikalwand bestimmt sind und die Einheit gegenüber dem Waschtisch (1) und dem Waschbecken (2) je einen verbindungslosen Abstand hat.

6. Heizkörper nach einem der Ansprüche 1 - 5, dadurch gekennzeichnet, dass die Heizrohre (5) eine flache Querschnittsform haben.

7. Heizkörper nach einem der Ansprüche 1 - 6, dadurch gekennzeichnet, dass mindestens ein in ein Heizrohr (5) eingesetztes elektrisches Heizorgan vorhanden ist.

8. Heizkörper nach einem der Ansprüche 1 - 7, dadurch gekennzeichnet, dass mindestens eines der Heizrohre (5) als Handtuchhalter ausgebildet ist.

9. Waschtisch mit Waschbecken, dadurch gekennzeichnet, dass unterhalb des Waschtisches (1) ein das Waschbecken (2) umgebender Heizkörper mit mehreren etwa U-förmigen, gegenüber dem Waschtisch (1) zurückstehend angeordneten Heizrohren (5) vorhanden ist, die an einer Vorlauf- und Rücklaufleitung (6, 7) einer Zentralheizungs- oder Brauchwasserleitung angeschlossen sind, wobei der Heizkörper entweder als eine vom Waschtisch/ Waschbekken (1,2) unabhängige Einheit an einer Vertikalwand befestigt oder auf der Unterseite des Waschtisches (1) befestigt ist.

Fig. 1

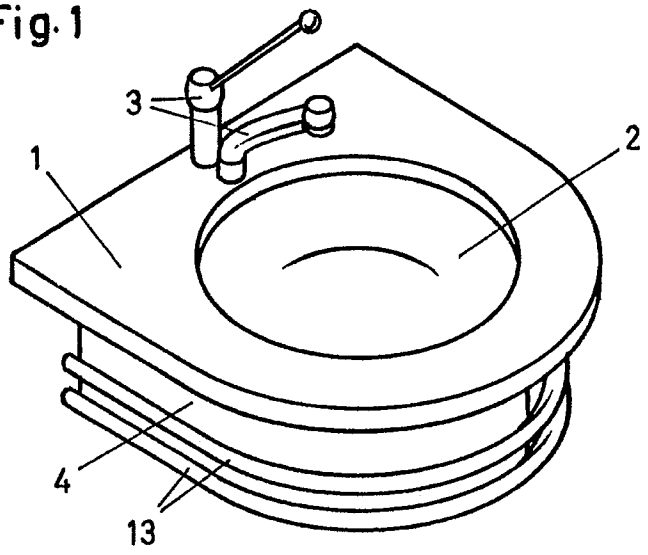


Fig. 2

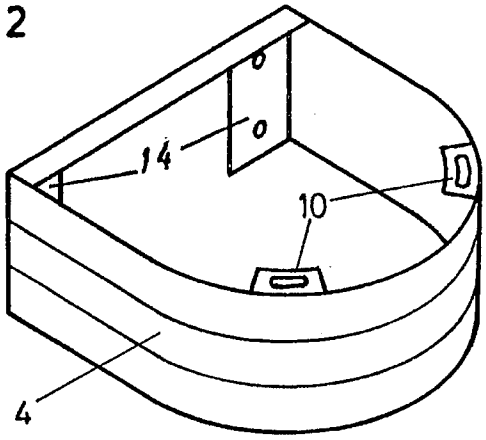
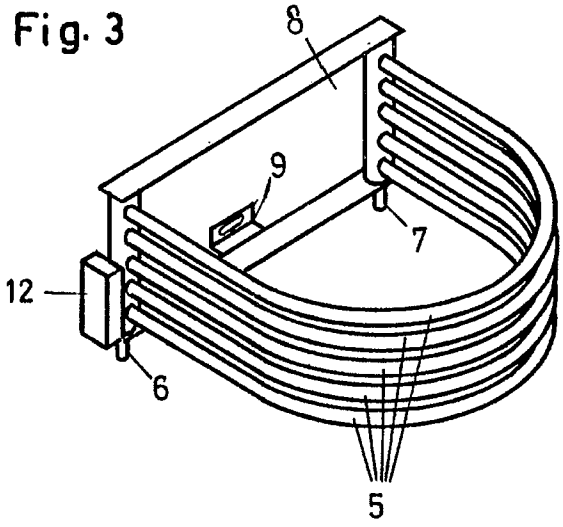


Fig. 3



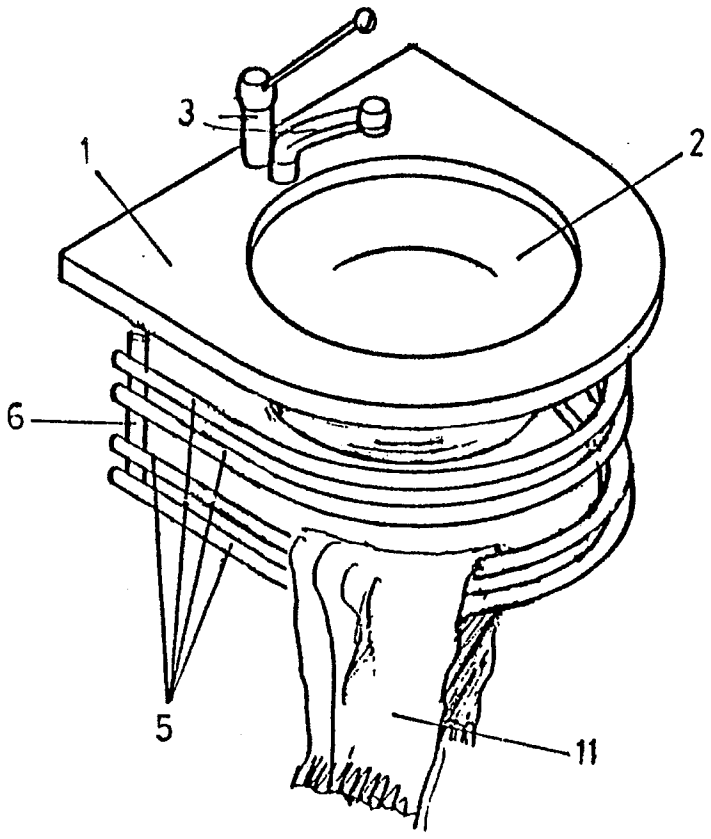


Fig 4.

Europäisches Patentamt

EUROPÄISCHER RECHERCHENBERICHT

Nummer der Anmeldung

EP 89 81 0505

EINSCHLÄGIGE DOKUMENTE

Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der maßgeblichen Teile	Betrifft Anspruch	KLASSIFIKATION DER ANMELDUNG (Int. Cl.5)
A	GB-A-1 104 261 (EGGESBÖ) * Insgesamt * ---	1,2,9	F 28 D 1/047 A 47 K 10/06
A	US-E- 32 616 (GRAHAM) * Insgesamt * ---	1,7	
A	FR-A-2 583 281 (GONNOT) * Insgesamt * ---	1	
A	EP-A-0 097 905 (CIE GENERALE D'ELECTRICITE) * Insgesamt * ---	1	
A	GB-A-1 042 996 (ASHFORD) * Insgesamt * -----	1	

RECHERCHIERTE SACHGEBIETE (Int. Cl.5)

F 28 D
A 47 K

Der vorliegende Recherchenbericht wurde für alle Patentansprüche erstellt

Recherchenort	Abschlußdatum der Recherche	Prüfer
DEN HAAG	05-10-1989	SMETS E.D.C.

KATEGORIE DER GENANNTEN DOKUMENTE

X : von besonderer Bedeutung allein betrachtet
Y : von besonderer Bedeutung in Verbindung mit einer anderen Veröffentlichung derselben Kategorie
A : technologischer Hintergrund
O : nichtschriftliche Offenbarung
P : Zwischenliteratur

T : der Erfindung zugrunde liegende Theorien oder Grundsätze
E : älteres Patentdokument, das jedoch erst am oder nach dem Anmeldedatum veröffentlicht worden ist
D : in der Anmeldung angeführtes Dokument
L : aus andern Gründen angeführtes Dokument

& : Mitglied der gleichen Patentfamilie, übereinstimmendes Dokument

EPO FORM 1503 03.82 (P0403)

EXHIBIT C

United States Patent [19]

Leuschner et al.

[11] **3,711,681**

[45] **Jan. 16, 1973**

[54] **ELECTRIC THRU-FLOW HEATER FOR USE WITH COFFEE MACHINES AND THE LIKE**

[75] Inventors: **Udo Leuschner; Wolf-Dieter Schubert,** both of Traunreut, Germany

[73] Assignee: **Siemens-Electrogerate GmbH,** Berlin and Munchen, Germany

[22] Filed: **May 11, 1971**

[21] Appl. No.: **142,287**

[30] **Foreign Application Priority Data**

May 14, 1970 Germany.....P 20 23 598.7

[52] **U.S. Cl.** .....**219/303,** 99/281, 99/288, 165/168, 219/283, 219/328, 219/336, 222/146 HE

[51] **Int. Cl.**.....**H05b 1/02,** A47j 31/00, F24h 1/14

[58] **Field of Search**.....219/296–299, 302–305, 219/308, 309, 311, 328, 335–338, 280–283; 165/167, 168, 171; 126/5, 54; 99/282, 281, 283, 306–314, 288; 222/146 HE, 146 H

[56] **References Cited**

UNITED STATES PATENTS

2,875,312	2/1959	Norton	219/302 UX
3,319,561	5/1967	Bloomfield	219/304 X
2,579,898	12/1951	Brucker	219/345 UX
1,257,106	2/1918	Parkhurst	219/457
3,513,767	5/1970	Bloomfield et al.	219/283 UX
2,987,300	6/1961	Greene	219/302 UX

FOREIGN PATENTS OR APPLICATIONS

531,681	8/1955	Italy	165/171
236,963	9/1945	Switzerland	219/283
802,271	10/1958	Great Britain	165/171
341,392	10/1921	Germany	219/302
423,121	7/1947	Italy	219/297

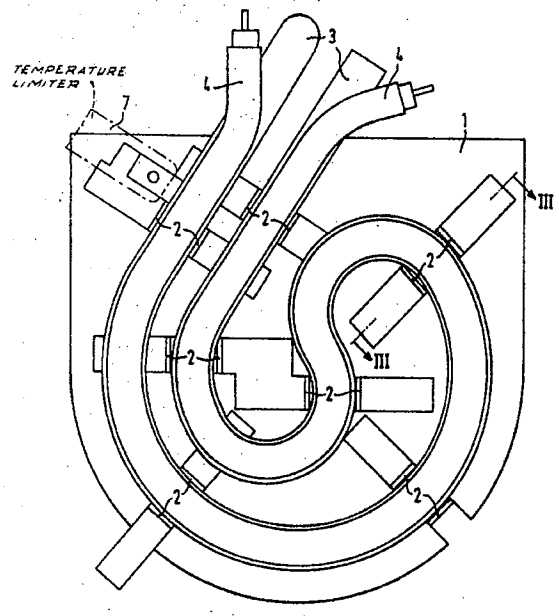
Primary Examiner—A. Bartis

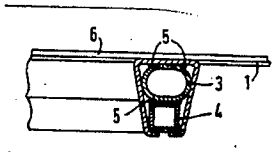
Attorney—Curt M. Avery, Arthur E. Wilfond, Herbert L. Lerner and Daniel J. Tick

[57] **ABSTRACT**

An electric thru-flow heater for coffee vessels includes a carrier plate with integral clamping means depending from its underside, serving to positively position and fix a water tube — tubular heating body combination. A sheet member on top of and coincidental with the carrier plate cooperates therewith to receive and warm a coffee vessel deposited thereon. Temperature limiting means connected to the carrier plate control the energy input levels to the tubular body.

3 Claims, 3 Drawing Figures





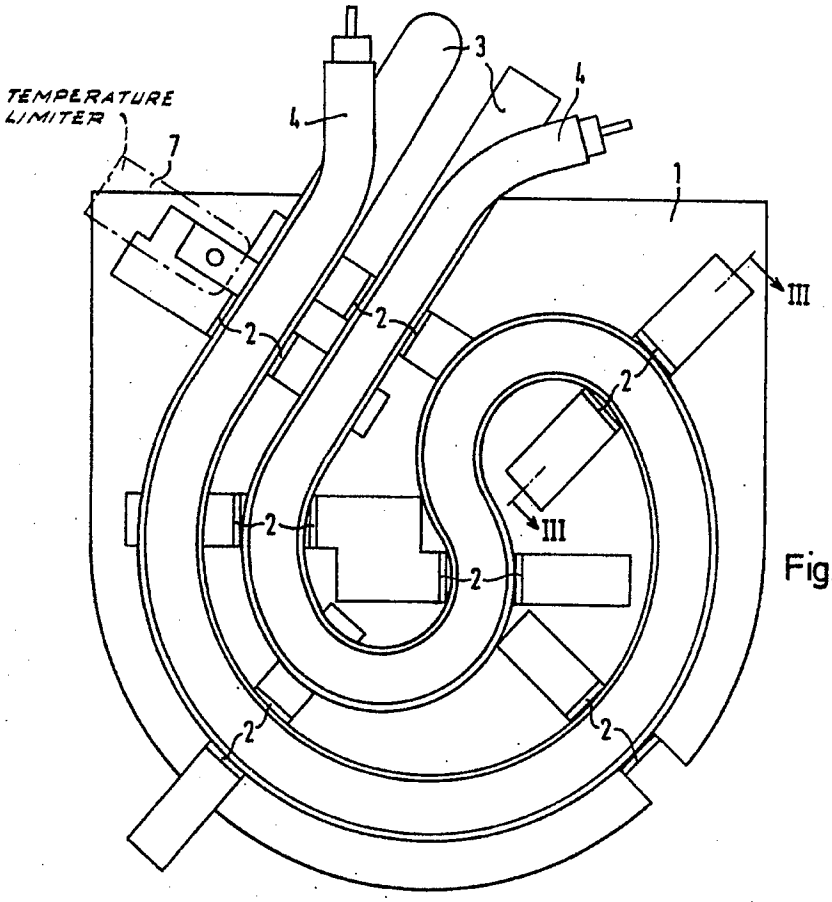


Fig. 1

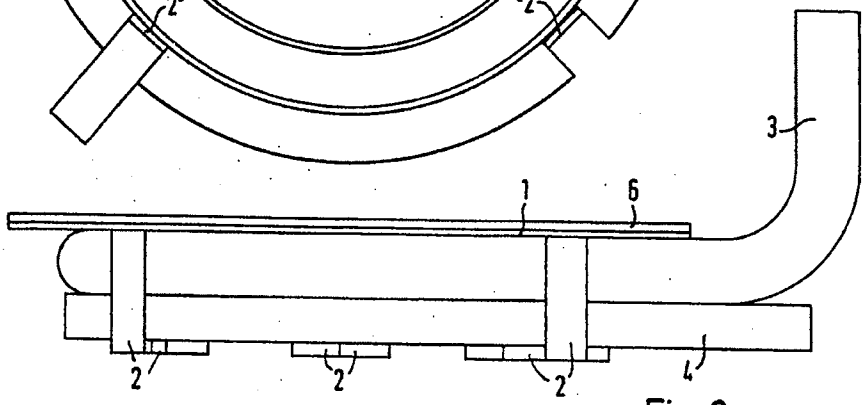


Fig. 2

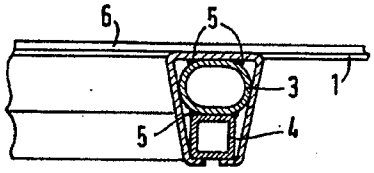


Fig. 3

ELECTRIC THRU-FLOW HEATER FOR USE WITH COFFEE MACHINES AND THE LIKE

Our invention relates to an electric thru-flow heater especially of the type used for coffee machines and the like. The thru-flow heater has a water tube arranged beneath a carrier plate and an electric tubular heating body is arranged along the water tube.

In the known embodiments of this type of thru-flow heater, the carrier plate is configured as a warm holding plate and is in the form of a die casting. The plate has grooves on its lower side for receiving the water tube and the tubular heating body. After these members are set in place the grooves are peened over. It has been shown however, that with such thru-flow heaters, the heating contact between the tubular heating body and the water tube on the one hand, and the heating contact to the carrier plate on the other hand, deteriorate with increasing use because of thermal changes. As a consequence of this condition, the temperature limiter arranged with respect to the thru-flow heater responds too late because of the disrupted thermal relationships, so that overheating can occur which, in turn, can cause destruction of the heater.

Accordingly, it is an object of our invention to provide an electric heater having a definitive thermal contact relationship. Subsidiary to this object it is an object of our invention to provide an electric thru-flow heater having an extended operational life.

According to a feature of our invention the water tube and the tubular heating body are tightly clamped by stamped out lugs to the carrier plate and are joined to each other and to the carrier plate by brazing.

With the foregoing and other objects in view, there is provided in accordance with the invention, an electric thru-flow heater for coffee vessels or the like, in combination, a carrier plate of good thermal conductivity having an upper member coincidental with and disposed on said carrier plate for receiving and warming coffee vessels placed thereon; a tubular assembly in cooperative working relationship with said carrier plate, including a water tube brazed to a tubular heating body and to the underside of said carrier plate; clamping means eminating from and integral with said carrier plate, adapted to positively fit said tubular assembly with respect to said carrier plate; and temperature limiting means connected to said carrier plate, adapted to control energy input levels to said tubular heating body.

The invention will now be described with reference to the drawings wherein:

FIG. 1 is a bottom view of the thru-flow heater according to the invention;

FIG. 2 is a side view of the thru-flow heater of FIG. 1; and,

FIG. 3 is the section of the thru-flow heater taken along the line III—III of FIG. 1.

The thru-flow heater illustrated in FIGS. 1 to 3 includes a carrier plate 1 made of copper sheet metal from which lugs 2 are stamped out in pairs. At the lower side of the carrier plate 1 there is a coiled water tube 3 arranged in a plane and along the latter on the side thereof away from the carrier plate 1 is directed a tubular heating body 4. The water tube 3 and the tubular heating body 4 are held tight in a clamp-like manner by the lug pairs 2 stamped from the carrier plate 1. In addition, the water tube 3 is joined to the carrier plate 1 and to the tubular heating body 4 by means of brazing 5. At the top side of the carrier plate 1 there is a sheet 6 made, for example, from stainless steel sheet metal which serves as the receiving surface for a vessel such as a coffee pot. A temperature limiter 7 is coupled to the carrier plate 1 for monitoring the permitted boundary temperature and serves to disconnect the energy supplied to the tubular heating body 4 when the preselected boundary temperature is exceeded.

While the invention has been described by means of specific examples and in a specific embodiment, we do not wish to be limited thereto, for obvious modifications will occur to those skilled in the art without departing from the spirit and scope of the invention.

We claim:

1. In an electric thru-flow heater for coffee vessels or the like, in combination, a carrier plate of good thermal conductivity having an upper member coincidental with and disposed on said carrier plate for receiving and warming coffee vessels placed thereon; a tubular assembly in cooperative working relationship with said carrier plate, including a water tube brazed to a tubular heating body and to the underside of said carrier plate; clamping means eminating from and integral with said carrier plate, adapted to positively fit said tubular assembly with respect to said carrier plate; and temperature limiting means connected to said carrier plate, adapted to control energy input levels to said tubular heating body.

2. An electric thru-flow heater according to claim 1, wherein said upper member comprises a sheet covering the top side of said carrier plate.

3. In an electric heater according to claim 2, said sheet being made of metal.

* * * * *

EXHIBIT D

United States Patent [19]

English et al.

[11] **4,446,158**

[45] **May 1, 1984**

[54] **APPARATUS FOR MAKING INDIVIDUAL BEVERAGE QUANTITIES**

[76] Inventors: **Philip H. English**, 425-41 Hill Dr., Aurora, Ohio 44202; **Anthony D. Szpak**, 6215 Jamestown Dr., Parma, Ohio 44134

[21] Appl. No.: **386,284**

[22] Filed: **Jun. 8, 1982**

[51] **Int. Cl.**[3] **A47J 31/02**; B65B 29/02

[52] **U.S. Cl.** **426/79**; 99/295; 99/304; 99/306; 426/77

[58] **Field of Search** 426/77–84; 99/295, 304, 306; 206/0.5

[56] **References Cited**

U.S. PATENT DOCUMENTS

1,499,281	6/1924	Altieri .	
1,601,987	10/1926	Topper .	
1,876,474	9/1932	Starkey .	
2,716,607	8/1955	Waline	426/79
2,743,664	5/1956	Dale .	
2,885,290	5/1959	Krasker .	
2,899,310	8/1959	Dale	99/295
3,083,101	3/1963	Noury	99/295
3,345,935	10/1967	Waline	426/79
3,373,677	3/1968	Petrozzo	426/77
3,389,650	6/1968	Michielsen	426/433
3,411,431	11/1968	Moerlini	99/304
3,420,675	1/1969	Costas	426/77
3,607,299	9/1971	Bolt	426/77
3,640,727	2/1972	Heusinkveld	426/77
3,692,536	9/1972	Fant	426/77
3,811,373	5/1974	Telco	426/77
3,822,013	7/1974	Vander Veken	99/295
3,823,656	7/1974	Vander Veken	99/295
3,846,569	11/1974	Kaplan	426/77
3,937,134	2/1976	Molenaar et al.	426/77
3,971,305	7/1976	Daswick	426/77
3,983,797	10/1976	Wurm	99/306
4,119,019	10/1978	Reid	99/306
4,158,329	6/1979	McKnight	426/80

FOREIGN PATENT DOCUMENTS

2151636	5/1972	Fed. Rep. of Germany	99/295
1080222	6/1953	France .	
1289610	2/1961	France .	
1347892	11/1962	France .	

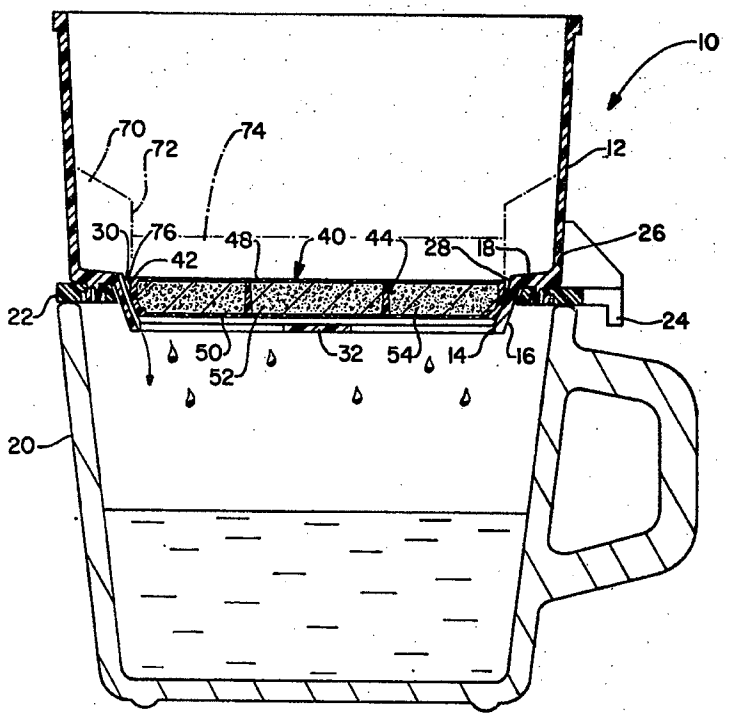
Primary Examiner—Steven L. Weinstein

Attorney, Agent, or Firm—Oldham, Oldham, Hudak, Weber & Sand Co.

[57] **ABSTRACT**

A disposable, individual coffee container and filter unit including a flat frame having an apertured center section, filter layers covering the top and bottom of the frame and being secured thereto, and individual quantities of coffee received in compartments formed in the frame between the spider-like center sections thereof. Additionally, a coffee brewing receptacle having an apertured base and a retainer flange in the base thereof for engaging the coffee carrying flat frame is provided.

13 Claims, 4 Drawing Figures



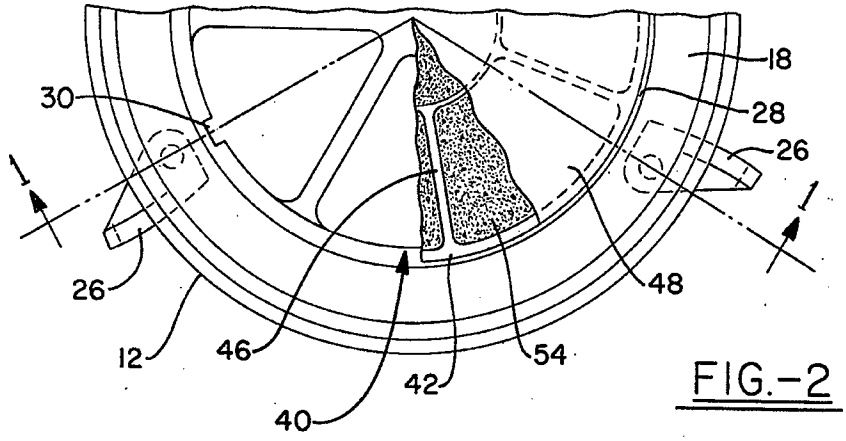

18
30
28
26
1
1
26
48
12
46
54
42
40

FIG.-2

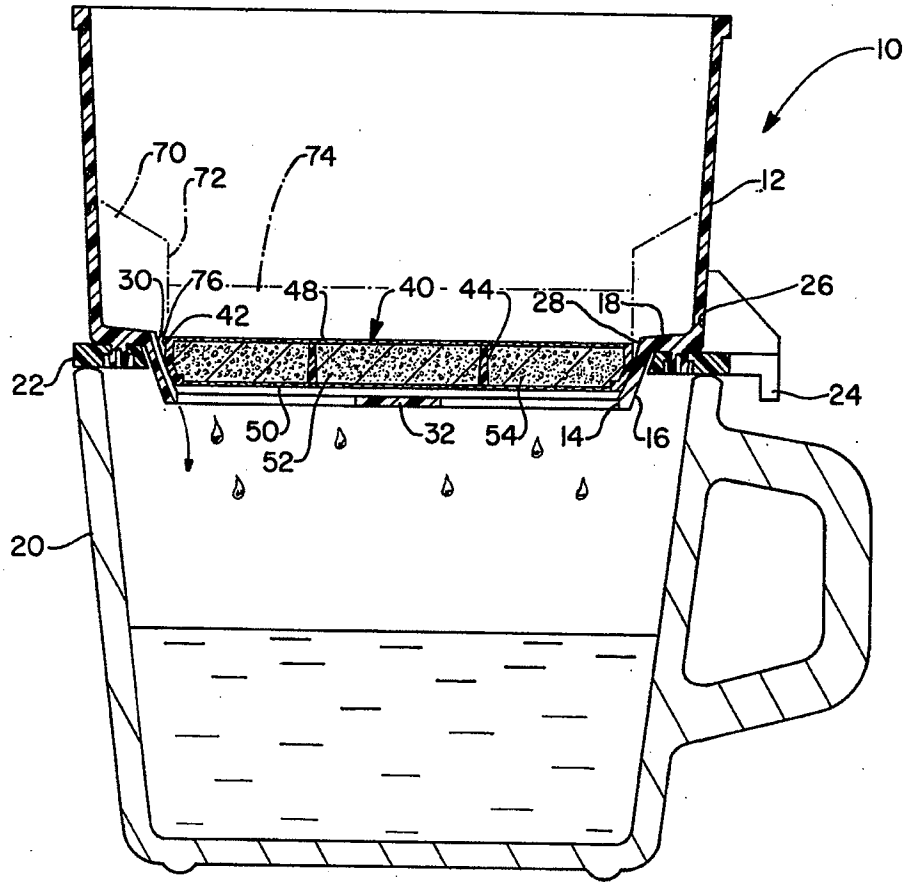

10
70
72
74
12
30
76
48
40
44
28
18
26
42
22
24
50
52
32
54
14
16
20

FIG.-1

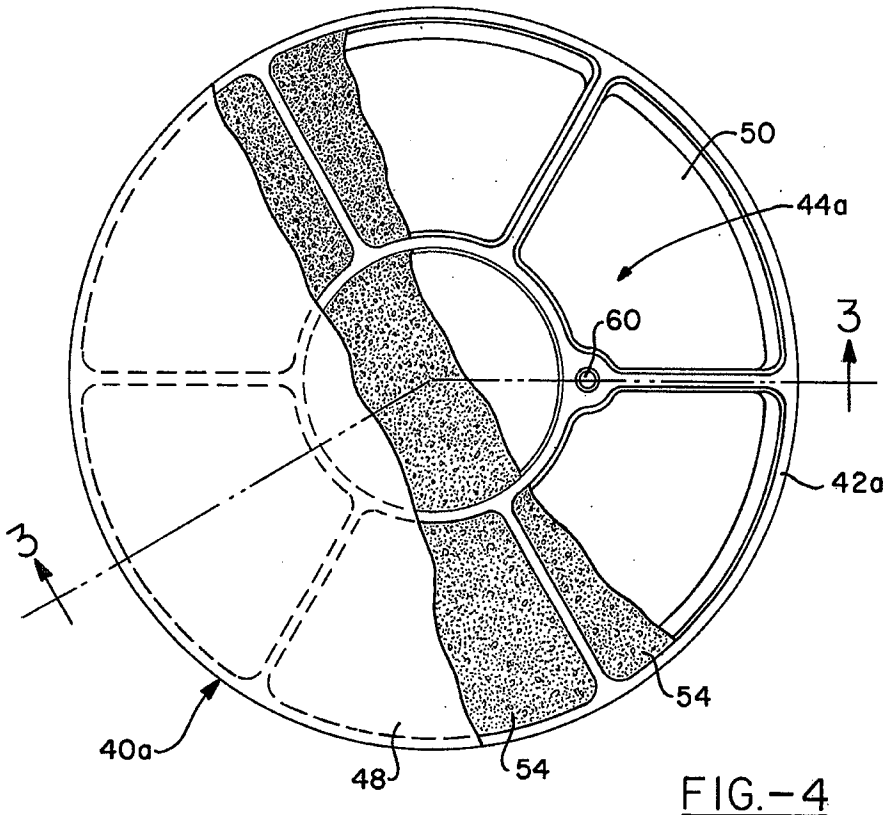


FIG.-4

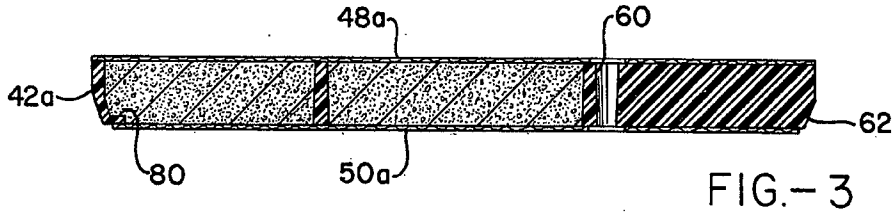


FIG.-3

APPARATUS FOR MAKING INDIVIDUAL BEVERAGE QUANTITIES

TECHNICAL FIELD

This invention relates to coffee and beverage making apparatus, and particularly to prepackaged quantities of coffee carried in a disposable filter frame wafer or unit adapted for making small quantities, such as one cup, of coffee at a time. A retainer cup or other holder member for positioning the coffee filter wafer operatively may comprise another part of the invention.

BACKGROUND ART

Heretofore, there have been many different types of apparatus and methods proposed for making coffee and wherein such apparatus or methods have purportedly facilitated the efficient production of excellent tasting coffee. Many of such prior efforts have involved the use of specified quantities of coffee and placed the coffee in retainers through which hot water is poured to provide the desired beverage.

A number of problems have arisen in using the prior structures, including the fact that the strength of the coffee obtained is not uniform, the coffee may take an undesirable length of time for its production, the coffee grounds provided have not been used efficiently, the apparatus may have been costly to make and use, or the system may have been objectionable for other reasons.

DISCLOSURE OF INVENTION

The general object of the invention is to provide a new improved package for use in making individual quantities of beverages, especially coffee and to form them of a repetitive, constant quality or strength.

Another object of the invention is to package individual quantities of coffee in a novel container which is inexpensive, which is adapted to be used once and discarded, and which is a clean, easily handled, readily used container for brewing predetermined, individual volumes of coffee, specifically one cup at a time.

Another object of the invention is to regulate the flow of water through a coffee containing filter unit whereby the coffee is efficiently used but yet the flow of water through the coffee containing unit is not retarded and does not take an undesirable length of time.

Still another object of the invention is to provide coffee making apparatus which is convenient to use and which can be used in association with containers of varying diameters with minimal difficulty or adjustment; to facilitate the production of small, individually brewed quantities of coffee of repetitive high quality: and to use a coffee carrying filter unit which readily will fit into a holding cup in sealed relation therewith for receipt of hot water for flow down through the coffee filter unit.

Another object of the invention is to provide a rigid frame having filter sheets on the top and bottom thereof and having individual quantities of coffee held in separate compartments provided in the rigid frame, which is made of minimal height.

Another object of the invention is to provide a coffee carrying disc or wafer including a spider-weblike support therein and with quantities of desirable particle size coffee retained within the container in different compartments thereof by top and bottom sheets on the wafer.

Yet another object of the invention is to minimize the channeling of water when flowing hot water through a coffee carrying member for coffee production.

Another object of the invention is to use finely ground coffee particles or even coffee powder in a coffee making process to obtain rapid production of quality, high strength coffee by use of reduced amounts of coffee.

A further object of the invention is to obtain increased extraction of coffee from coffee particles positioned in a disposable spider-weblike wafer and to control the rate of flow of water through the coffee carrying wafer.

Other objects of the invention are to provide a unitary quantity of packaged coffee in a disposable wafer-like carrier designed to fit into a receptacle in sealed relationship therewith, and which can be readily positioned in a receptacle; to substantially fill a plurality of compartments in a coffee carrying unit with finely ground coffee particles; to avoid the swelling of coffee particles during the coffee brewing action; to provide a repetitive type of a coffee making unit adapted for making small quantities of coffee such as a single cup of coffee by use of uniform operating conditions; and to provide multiple cavities in a coffee carrying wafer to prevent the coffee from shifting laterally in the wafer and obtain a more uniform water flow through the individual cavities of the wafer.

These and other objects of the invention will become more apparent as the specification proceeds are achieved by: a disposable individual beverage forming container and filter unit, comprising: a flat frame having an apertured center section; filter layers covering the top and bottom of said frame and being secured thereto: said center section including a plurality of portions defining a plurality of separate areas in said frame; and individual quantities of beverage forming material received in said areas.

BRIEF DESCRIPTION OF DRAWINGS

Reference now is made to the accompanying drawings, wherein:

FIG. 1 is a fragmentary vertical section taken on line 1—1 of FIG. 2, through a coffee container and filter unit embodying the principles of the invention operatively positioned in association with a hot water receiving receptacle carried by a coffee receiving cup;

FIG. 2 is an enlarged fragmentary plan view of the apparatus of FIG. 1 with part of the filter unit broken away and the coffee receiving cup omitted;

FIG. 3 is a vertical section taken on line 3—3 of FIG. 4; and

FIG. 4 is a plan view of a modified coffee container and filter unit of the invention.

When referring to corresponding members shown in the drawings and referred to in the specification, corresponding numerals are used to facilitate comparison therebetween.

BEST MODE FOR CARRYING OUT THE INVENTION

A disposable individual coffee container and filter unit comprising a flat annular frame having a spider-weblike center section, filter layers secured to the top and bottom surfaces of the frame and covering the same, a plurality of separate areas being defined within the frame by ribs of the center section, and individual quantities of coffee received in and substantially filling

the aforementioned areas. The invention also relates to use of the disposable coffee container and filter unit with a receptacle having a base with an apertured center portion which includes a dependent, substantially frusto-conically shaped flange and which is formed complementary to the periphery of said coffee container and filter unit for receipt of the same in such flange whereby hot water can be poured into the receptacle and flow through the coffee container and filter unit for beverage production.

Attention now is particularly directed to the details of the construction shown in the accompanying drawings and FIG. **1** best shows the individual volume coffee or beverage maker of the invention. Specifically coffee making apparatus indicated as a whole by the numeral **10** is shown and this apparatus includes a receptacle **12** that has an apertured center **14** usually including a substantially frusto-spherically shaped flange **16** which connects the aperture **14** to a base **18** of the receptacle. This receptacle **12** is adapted to be carried by any type of a cup or other receptacle **20** provided to receive the beverage to be produced.

It is a feature of the invention that the receptacle **12** can be adapted to engage with any of a variety of sizes or diameters of cups or other containers for the desired beverages, and to facilitate this positioning for the receptacle **12**, it is provided with a plurality of pivotally positioned tabs, lugs or brackets **22** that engage with a bottom surface of the base **18** which is flat at its periphery. These lugs or tabs **22** have a dependent outer flange **24** and a vertically upstanding shoulder **26** whereby the lug can be swung radially outwardly to extend the flange **24** out to a maximum diameter for engaging the lip of the beverage receiving cup **20**. The lugs rotate to facilitate reducing the size of the receptacle **12** to allow its insertion into a typical automatic coffee brewer grounds basket for receipt of a disposable coffee and filter unit of the invention. In this use, the automatic brew device (such as a "Mr. Coffee") is used solely to provide a hot water source. Then the brewed coffee would pass into a standard carafe or serving cup placed below the brewing basket. This feature permits the conversion of a standard automatic brewer which is typically not used for brewing one cup of coffee into an efficient one cup automatic brewer.

The receptacle **12** has an apertured center **14** of a suitable type for engaging the coffee carrier wafer as hereinafter described. Such center is shown as comprising a spider-like open frame **32**. The purpose of frame **32** is to align the carrier wafer in an approximate horizontal position to help insure proper engagement of the sealing surfaces.

As previously indicated, the aperture **14** has this frusto-spherical flange **16** formed thereon and hence a spherical surface **28** is provided on the inside of the flange for a reason to be described hereinafter in more detail. It is another important feature of the invention that at one small peripheral area of this spherical surface **28** a vertically extending recess or slot **30** is formed in such spherical surface to recess the same and provide a by-pass opening in the receptacle for flow of liquid through such recess when coffee or beverages are being made by pouring liquid through the coffee carrier unit positioned in the receptacle **12**. Such by-pass slot **30** provides an added control for the rate of water flow through or by the coffee carrier unit.

FIG. **1** shows the beverage making process and thus, a disposable, individual coffee container and filter unit **40** is shown in removable engagement with this spherical surface **28** formed at the bottom of the receptacle **12**. This unit **40** is made from a flat, annular frame **42** that has a spider-web like center section **44**. The frame **42** can be made from any suitable material and preferably is made by molding it from a suitable plastic material, and the center section **44** includes a plurality of ribs or legs **46** that divide the center portion of the frame **42** into a plurality of compartments.

This disposable, individual coffee container and filter unit has a pair of filter layers **48** and **50** suitably secured to the top and bottom surfaces of this frame **42**. The filter layers usually comprise filter paper and they may be heat sealed, for example, to the plastic frame **42** or be otherwise secured to the frame.

So as to make the unit **40** of the invention operative, initially only one of the filter layers **48** or **50** is positioned on the frame **42** and after that a quantity of coffee particles **52** are placed within the individual compartments **54** formed between the adjacent legs **46** and a peripheral portion of the frame **42**. These compartments **54** extend the height of the frame and normally are loosely filled with coffee particles that relatively fully pack the compartments **54**. Naturally after the compartments are filled with the coffee particles, then the other filter layer is suitably fixed to the remaining open side of the compartment to enclose the coffee particles.

It is important in practicing the present invention that, for best operative properties, the coffee bean be ground to at least "fine" particle size prior to being positioned within the unit **40**. Such "fine" coffee particles could be those really considered to be ultra-fine ground coffee in the nomenclature of coffee grinding machines in use commercially at the present time. The coffee particles are, in effect, ground down to almost powder size but in all events comprise a really ultra-fine coffee particle grind. The reason why we find it extremely desirable to use this ultra-fine coffee particle size in practice of the present invention, is that we wish to avoid the coffee particles swelling during the coffee making action and conventionally ground coffee particles swell in the coffee making process, normally, and our ultra-fine ground coffee particles swell markedly less than standard drip grind particles or possibly not at all. Accordingly, the particles can substantially if not almost completely, fill the compartments **54** in the units **40** and yet will not give any trouble to water flow through the unit **40** by swelling up in the compartments and subsequently reducing the water flow rate.

We also have found that the use of ultra-fine ground coffee facilitates extraction of the coffee from the coffee particles and obtains a beverage of desired strength by use of minimum amounts of coffee. Yet a further important factor in use of a substantially filled compartment **54** and use of an ultra-fine ground coffee is that water poured onto the unit **40** will relatively rapidly pass through the filter, especially when we combine our by-pass recess **30** with the unit. By varying the size of this by-pass recess, we can facilitate flow of water through the unit **40** and out of the receptacle **12**.

We have found that we can brew one cup of coffee in less than two minutes with excellent extraction by use of the individual coffee container and filter unit **40** that is designed with a minimal height and maximized diameter to reduce resistance to fluid flow; by utilizing an ultra-fine grind of coffee and, in addition, by providing a means for some of the water to by-pass unit **40** during the brew cycle. It is however recognized that the by-

pass is not necessary for achievement of a good brew in a reasonably short period of time. The by-pass simply provides a means to control and minimize brew time in a manner that is independent of the flow resistances through unit **40**. The use of substantially larger coffee particle sizes, such as standard drip grind, results in a brew time that normally is in excess of three minutes for good extraction. Test results furthermore indicate that our coffee making apparatus results in increased yield of approximately 25% from the grounds used (compared by color) to a brew from a standard "Mr. Coffee" automatic drip coffee maker when our one cup brew is compared to a six cup brew from the "Mr. Coffee".

We also find that we can make quality beverages i.e., coffee of repetitive strengths by use of the disposable unit **40** and one portion of our unit **40** that facilitates such action is the individual compartments **54** provided within the frame **42** and no or limited "channeling" of hot water flowing through the unit can occur. The coffee particles are retained in substantially uniform layer form for uniform resistance to water flow through the unit **40** in the different compartments **54** of the invention minimizing shifting of the coffee particles therein during use, transit and/or storage of the unit.

After all of the water has flowed through the disposable units **40** into the cup **20**, naturally the receptacle **12** can be lifted off of the cup and then the unit **40**, which normally is just dropped into position to engage the flange **16**, can be removed by just inverting the receptacle **12**. The receptacle **12** can be washed and stored for another use. The individual disposable coffee container units **40** of the invention can be stacked on top of each other and they are of minimum vertical height whereby they can be packaged and sold in relatively compact small units.

Obviously the disposable units **40** can be made of any suitable size but we particularly contemplate making just individual coffee cup or size units to permit repetitive high quality coffee to be obtained by a single person or group requiring only one or two cups of coffee at one time. Obviously, if desired, the disposable units **40** could be made larger in diameter and/or slightly thicker in vertical dimension, as desired. However, the quantities of coffee received therein would be doubled or quadrupled, etc., depending on the number of cups of coffee to be made by the filter units.

These larger individual filter and coffee container units may be ideally suited to restaurant use where perhaps 10 to 12 cups of coffee would be brewed with each unit. Also, two of the units **40** can be stacked on top of each other in the receptacle **12** and additional water poured through the units to make two cups of coffee. To position the upper unit **74** circumferentially spaced ribs **70** can be formed on the receptacle **12**, FIG. **1**, to engage the upper units by vertical shoulders **72**. However, we particularly find our disposable units **40** to be especially desirable in making just single cups of coffee at one time, as set forth hereinabove.

FIGS. **3** and **4** show details of a modified disposable coffee container and filter unit **40***a*. This unit **40***a* has a frame **42***a* with an apertured open center section **44***a* like the filter unit **40**. The unit **40***a* has a by-pass hole **60** formed in it and extending from top to bottom of the unit. Hence, no by-pass recess would be required in the coffee making receptacle with which it is to be used, or the by-pass opening could also be in the peripheral base area **18** of the receptacle as desired.

This filter unit **40***a* is generally the same as the unit **40** and has a lower corner portion **62**. Such corner portion **62** is shaped and sized complementary to a base flange like the flange **16** of the receptacle **12**. Such corner portion normally is frustospherical in vertical section for seating on and sealing against such base flange in the manner previously described.

The word coffee is used herein primarily to refer to the beverage produced by flowing hot or boiling water through coffee bean particles. Coffee particles or powder referred to herein means coffee bean particles or powder. Fine particles of the coffee bean as used herein, for example, are taken to be particles that can pass through mesh openings $\frac{1}{2}$ mm by $\frac{1}{2}$ mm and many particles may even be appreciably smaller than the $\frac{1}{2}$ mm^2 size. Such particles may vary in size quite a bit but are much smaller than typical standard drip grind coffee bean particles, many of which are in the range of 1.0 mm × 1.0 mm to $1\frac{1}{2}$ mm and $1\frac{1}{2}$ mm.

Normally, a six ounce cup of coffee is to be made by the apparatus.

Obviously the size of the by-pass recess **30** or hole **60** can be changed to control the time of the coffee making cycle. By use, for example, of a by-pass hole of a diameter of about 0.077 inch, excellent coffee was obtained with filter units as those described by brew times of from about 90 to 120 seconds. The filter unit was $2\frac{5}{8}$ inch in diameter and 3/16 inch thick.

It will be seen that the disposable beverage providing container and filter units of the invention can be positioned in any suitable carrier receptacle or basket for controlled flow of hot water through the filter units **40** or **40***a*. The hot water may be provided by a known type supplier such as a "Mr. Coffee" and the hot beverage filtrate produced can be collected in any suitable manner by a receptacle spaced from the filter unit. The filter units wuld be in sealed engagement, as described hereinbefore, for controlled flow of hot water through the filter unit. The filter units may be positioned in a slide basket prepared for use in a hot water heater such as a "Mr. Coffee" or the like, to replace positioning the filter units in the receptacle **12**.

The frame **42** of the filter unit has a vertically extending upper edge **76** on its periphery and the shoulder **72** frictionally engages such edge to retain the second filter unit **74** in place when two cups of beverage are to be made at one time.

It will be noted that the filter units should seal against the support surface of a support or carrier receptacle for best coffee making action so that the surfaces **62** and **28** are of complementary, frusto-spherical shape. As a modification, the carrier receptacle may have two horizontally aligned filter unit receiving openings therein for multi-cup brewing action. Obviously any quantity of hot water can be supplied to the receptacle **12** or to any other receptacle used to position the filter units of the invention but such hot water quantity will naturally be coordinated with the amount of coffee provided by the filter unit means.

FIG. **3** best shows the plastic frame of the beverage container and filter units of the invention and the filter sheets or layers thereon. Filter frame **42***a* has an inwardly extending horizontal flange **80** at its lower edge. Note that the filter sheet **50***a* terminates radially inwardly from the frame edge as the sheet can be pre-cut to size and just be suitably secured to the frame to avoid any interference with the sealing surface of the corner portion **62**. The filter sheet **48***a* may extend to the edge

of the frame and it can be presized or be cut to size after attachment to the frame. Any sheet edge will not interfere with the seal of the frame unit when operative as the sheet **48***a* is above the sealing surface of the frame **42***a*.

From the foregoing, it is submitted that a disposable, individual coffee container and filter unit fulfilling the objects of the invention has been provided and that an improved beverage making apparatus has been developed. It is possible to put other soluble materials into the individual units **40**, as desired, for making tea or other beverages, but the invention is especially directed towards the production of small one cup or larger quantities of repetitive quality and strength coffee. Hence, the objects of the invention have been achieved.

While one complete embodiment of the invention has been disclosed herein, it will be appreciated that modification of this particular embodiment of the invention may be resorted to without departing from the scope of the invention.

What is claimed is:

1. A disposable individual beverage forming container and filter unit, comprising:

a uniform height impervious frame having an apertured center section and having a top and bottom;

filter layers covering the top and bottom of said frame and being secured thereto;

said center section including a plurality of portions extending the heighth of said frame and defining a plurality of separate compartments in said frame:

individual quantities of beverage forming material received in said compartments, the beverage forming material being coffee that substantially fills the space between said filter layers, and said coffee is made of finely ground particles,

a water by-pass being formed in said frame and it operatively extends from top to bottom thereof, which by-pass provides an added control for the rate of water flow through the container filter unit, which container and filter unit has at least substantially uniform water flow through properties at all areas thereof excluding said water by-pass.

2. A disposable individual beverage forming container and filter unit as in claim **1**, wherein said frame has an inwardly extending flange at its lower edge, and the said filter layer on the bottom of said frame is secured to said flange and terminates radially inwardly of the periphery of said frame to avoid contact with a retainer for said unit to facilitate the sealing of said unit in the retainer.

3. A disposable individual beverage forming container and filter unit as in claim **2**, where said frame is made from plastic, and said frame has an inwardly tapered surface at its bottom peripheral edge for sealing engagement with a positioner device for the filter unit when operatively positioned.

4. A disposable individual coffee container and filter comprising:

a uniform heighth annular frame having a spider web-like center section;

filter paper layers covering the top and bottom of said frame and center section being secured thereto;

said spider web-like center section including a plurality of webs defining a plurality of areas in said annular frame;

said filter paper layers and said areas combining to form a plurality of separate compartments: and

individual quantities of coffee received in said compartments, said webs being of the height of said annular frame and said compartments being filled with uniform heighth layer of ultra fine coffee particles, all areas of the coffee container and filter having substantially uniform water flow through characteristics.

5. A disposable individual beverage forming container and filter unit as in claim **4**, where substantially uniform thickness layers of coffee particles are present in said compartments and said coffee particles are retained as a substantially uniform thickness layer in transit and use.

6. A coffee making apparatus adapted to be positioned on and/or over a serving cup or other container and comprising:

a receptacle having a base with an apertured center including a dependent flange having a spherically shaped inner surface portion, said flange connecting said apertured center to the remainder of said base; and

a disposable individual coffee container and filter unit comprising:

an annular vertically short uniform heighth frame having a partitioned center section;

filter layers covering the top and bottom of said frame and secured thereto;

ultra fine coffee bean particles received in said frame between said filter layers and filling separate partitioned areas in said frame and being a substantially uniform heighth; and

said frame having a peripheral edge having a substantially frusto-spherical peripheral surfaced formed complementary to at least a portion of said inner surface of said flange of said receptacle whereby said coffee container and filter unit can be readily placed in said receptacle to seal against said flange.

7. A coffee making apparatus as in claim **6**, where said seal between said flange and said coffee container and filter unit is broken by a by-pass recess formed between a portion of said flange and said peripheral edge surface of said frame, which by-pass provides for flow of water around said coffee container and filter unit.

8. A coffee making apparatus as in claim **6**, where a lower corner peripheral edge section of said frame is that said portion formed complementary to said flange inner surface.

9. A coffee making apparatus as in claim **6**, where said apertured center of said receptacle comprises spider-like partition means positioned at a lower portion of said flange, said coffee container and filter unit normally being positioned above said partition means when engaged with said flange but with said partition means limiting tilting of said coffee container and filter unit so as to maintain sealing engagement of said unit and flange.

10. A coffee making apparatus as in claim **6**, where a lower corner peripheral edge section of said frame is formed complementary to a part of said spherical surface and engaged therewith, said coffee container and filter unit normally can be dropped into said receptacle to form a sealed engagement with said flange.

11. A coffee making apparatus adapted to be positioned on or over a serving cup or other container or positioned within a water heating device and comprising:

a receptacle having a wall defining a bottom opening and;

a disposable individual coffee container and filter unit comprising:

an annular uniform heighth frame having a partitioned apertured center section, all portion of said center section extending the heighth of said frame;

filter layers covering the top and bottom of said frame and secured thereto;

ultra fine coffee particles received in said frame and filling space formed by said partitions in said frame between said filter layers as a substantially uniform layer, said coffee container and filter unit having at least substantially uniform water flow through characteristics at all equal areas thereof; and

said frame having a periphery formed with a portion complementary to an inner surface portion of said bottom opening in said receptacle whereby said coffee container and filter unit can be readily placed in said receptacle, and be supported over said bottom opening in sealed engagement therewith.

12. A coffee making apparatus as in claim **11**, where said coffee container and filter unit has at least one water by-pass opening formed therein and extending from top to bottom thereof, and said coffee particles are retained as a substantially uniform layer during transit and use.

13. A coffee making apparatus as in claim **11**, where said coffee container and filter unit and said receptacle wall forming the said bottom opening form an assembly having a water by-pass opening provided therein.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 4,446,158 Dated May 1, 1984

Inventor(s) Philip H. English and Anthony D. Szpak

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In Column 3, Line 13, delete the word "and" and substitute --.-- .

In Column 7, line 63, insert --and-- before the word "being".

In Column 8, line 33, change "surfaced" to --surface--.

In Column 9, line 4, change "portion" to --portions--.

Signed and Sealed this

Seventeenth Day of *December 1985*

[SEAL]

Attest:

Attesting Officer

DONALD J. QUIGG

Commissioner of Patents and Trademarks